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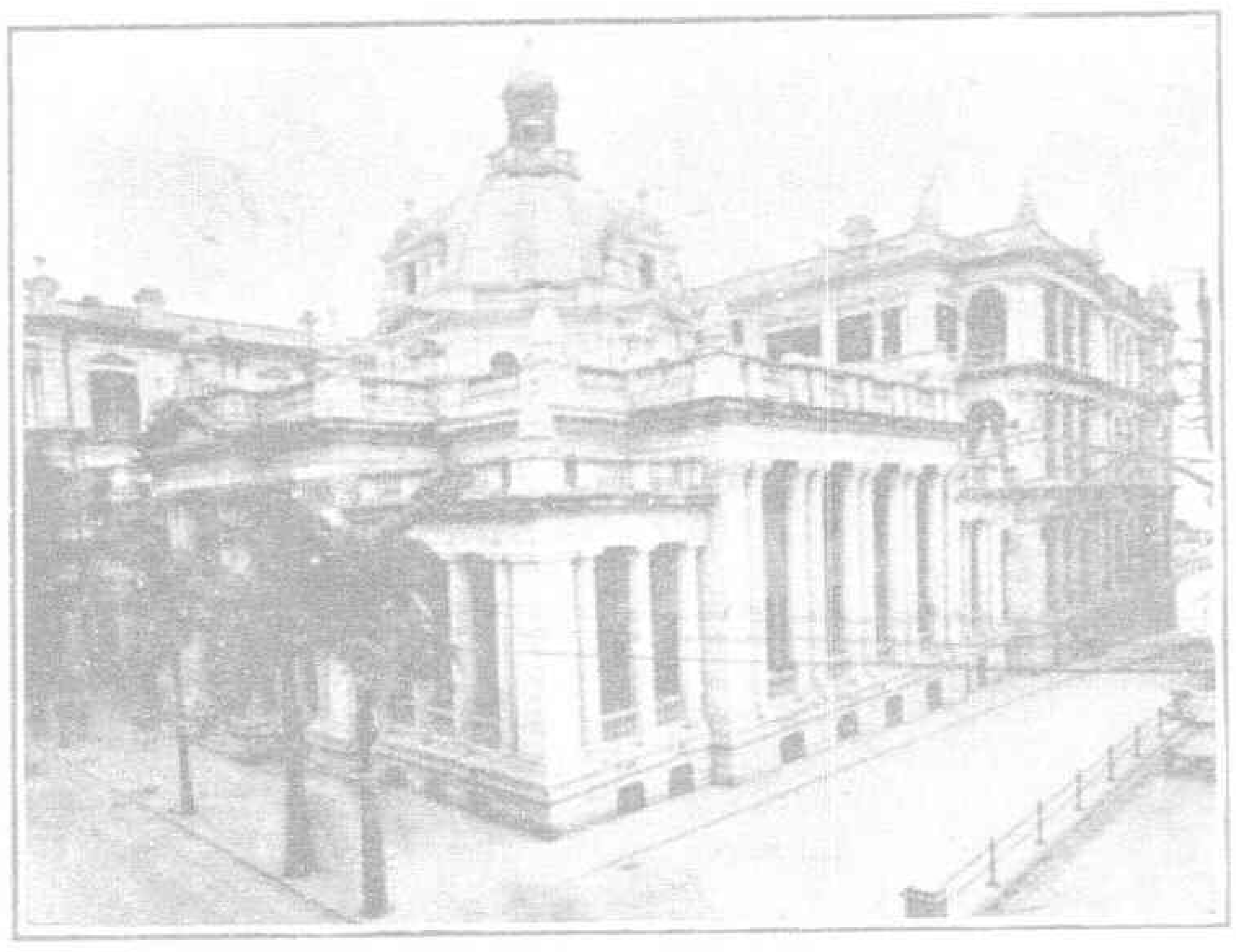

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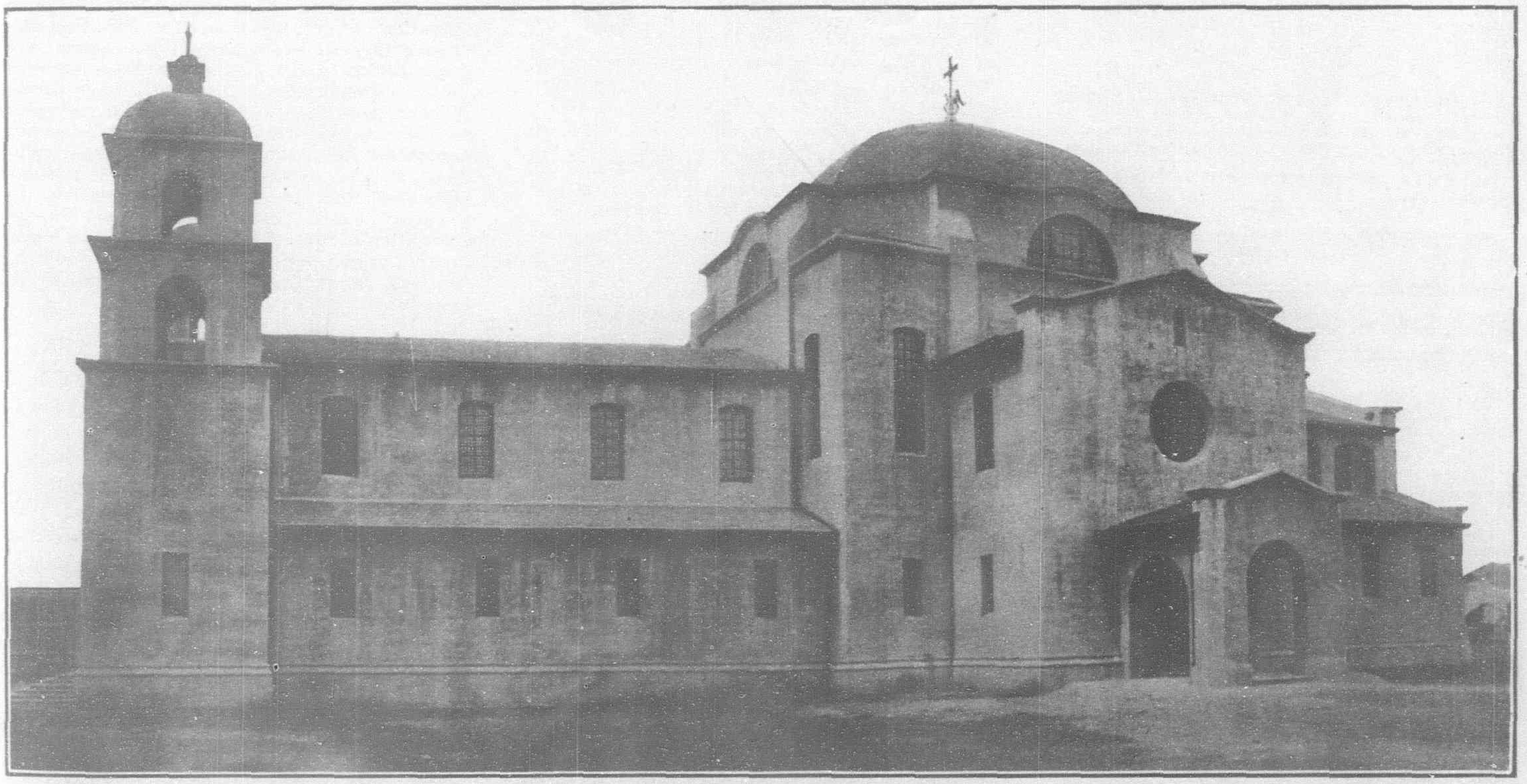
THE FAR EASTERN REVIEW
COMMERCE ◆ ENGINEERING ◆ FINANCE

VOL. III. MANILA, P. I., SHANGHAI, AND YOKOHAMA, NOVEMBER, 1906. No. 6.

REINFORCED CONCRETE IN THE CATHEDRAL CHURCH OF ST. MARY AND ST. JOHN, AT MANILA

(Constructed under contract by the Atlantic, Gulf and Pacific Company)

The Protestant Episcopal Cathedral Church of St. Mary and St. John, the construction of which has just been completed by the Atlantic, Gulf and Pacific Company, the contracting concern that undertook the work, is not only the most modern and attractive edifice of its kind in Manila, but in the entire Far East. It is, in addition, the first church in the Orient in which the latest approved methods of reinforced concrete construction have been exclusively applied, and for this reason as an engineering and architectural achievement it can not help but attract universal interest and attention.



SOUTH ELEVATION OF THE CATHEDRAL CHURCH OF ST. MARY AND ST. JOHN

It is an accepted fact by engineers that reinforced concrete structure, so far as its fire-resisting qualities is concerned, is unsurpassed by any other building material, no exception being made other, perhaps, than the asbestos or firebrick, which are only used for this purpose in those particular lines of industry governed by the application of intense heat. In addition, reinforced concrete buildings are practically earthquake proof. During the recent seismic disturbances in California, concrete buildings everywhere withstood the shocks and were practically undamaged. This was particularly prominent at the Leland Stanford Jr. University, at Palo Alto, where a brick and stucco structure standing alongside of a reinforced concrete building before the earthquake, was entirely destroyed—left nothing but a mass of broken bricks—while the concrete structure stood up perfectly. In most parts of the Orient, particularly in the Philippine Islands and Japan, where a destructive tremblor is liable to occur any minute, this advantage is not to be overlooked.

White ants do not fatten off of reinforced concrete, nor is the material affected by dry rot. As the building increases in age, the concrete constantly grows stronger, chemical changes taking place for a number of years after building operations have ceased. Another advantage is that reinforced concrete lends itself readily to ornamentation of every character; and last, but not least, the cost is not excessive—in fact, not more expensive than a building constructed of superior or 1st-group timber.

Taking all these facts into consideration, and many other advantages it is not necessary to mention at this time, the least that can be said of the Cathedral Church of St. Mary and St. John is that the promoters of this magnificent edifice displayed remarkable wisdom and forethought when they determined for reinforced concrete as their choice of material with which to build.

STYLE OF ARCHITECTURE.—The Cathedral Church of St. Mary and St. John is the gift of Mrs. Mary Bryant Brandegee, of Faulkner Farm, Brookline, Mass., a former parishioner of the Rt. Rev. Charles H. Brent, Bishop of the Philippine Islands, when he was connected with St. Stephen's Church, Boston. The sum of $100,000 gold was donated for the building, and the architects selected to prepare the plans were Messrs. Sturgis & Barton, of Boston. The plans were submitted to a committee in America consisting of Messrs. Amory Gardner, Charles G. Lawrence, D. Berkeley Updike and Silas McBee. They were executed with great care, and with special reference to the oriental conditions for which they were designed. It was decided by those who had the matter in hand that a gothic building, both structurally and architecturally, would be out of place, and the dignified and classic lines of the Spanish Renaissance were followed. A reminiscence of the simple and beautiful mission architecture of California may be noted in the towers. In order to subdue the rather oppressive massive-

(Continued on page 178.)

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.
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MANILA, SHANGHAI AND YOKOHAMA, NOVEMBER 1906

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GOVERNMENT "SUBSIDIES"

During the last month, rumors, the outgrowth of ignorance of the facts, have reached us to the effect that this paper is a subsidized organ of the Government. Nothing is more foreign to the relations of The Review with the insular Government. As a medium through which to give publicity to the urgent needs of the Philippines, and to promote our commerce and industries at home and abroad, the Philippine Commission has always regarded The Review most valuable on account of its high standard, its conservativeness and its solidity; and this has prompted the Government to give to this paper a share of the financial patronage which is appropriated to nearly every other paper published in Manila, regardless of the language or dialect in which it is printed. For every dollar The Review is receiving it is giving value in return by way of the circulation through the mails of specified numbers of the paper for which there is no other charge; in other words, the Government subscribes to a certain number of papers regularly, for the proper distribution of which our business office must regularly account. The Commission has authorized this patronage since the birth of the paper, the fact of its having renewed its subscription appropriation repeatedly being sufficient proof to us that our own estimation of the value of The Review as an advertising medium for the Islands is not overdrawn. The columns of The Review are, and always have been, independent. While our relations with the Government have always been most cordial, and mutually helpful, we have yet to be approached either directly or indirectly by any member of the Commission, or other high official, on the question of editorial policy. It is true that in policy we are pro-Government, but we are not so much so that we must always see only good in the work being done. We have on several occasions criticized acts of prominent officials because we have believed them wrong; we will continue to be just as independent in the future. We do not believe in "flying off the handle" and working ourselves into a tangent over petty politics and smaller trivials that don't look as good to us as they might, because this is out of our line. We are here to look after the immense and broad field of commerce, engineering, finance and industry, and by attending strictly to our field to do all we can towards maintaining American prestige, American influence and American colonial Government as it is being exemplified in the Philippine Islands. Rather than make petty politics the basis of our journalism we would suspend publication. Neither will we have anything to do with international jealousies nor racial antagonism. We want everybody in the Far East, and in the homeland as well, to take an interest in our insular Government, and in the Philippines, and it is to this end we are striving. The Philippine Commission needs our friendship and so do the Islands—and both deserve it and will have it. But this is not promising that the interests of the business community will have none of it. On the other hand, the business man's welfare is our first concern, because without commercial and industrial prosperity in the Philippines and throughout the Orient we can not hope to prosper. So let the originators of street rumor cease to intimate "subsidy" when the relations of The Review with the Government are discussed. The word has a ring which no self-respecting newspaper worker likes to hear.

PHILIPPINE LAND AND LABOR

A letter signed by the chairman of the committee appointed by the American Chamber of Commerce and sent out with the last number of The Far Eastern Review contained several representations which we believe to be misleading and which we believe should be editorially corrected.

The committee in a moment of enthusiasm speaks of "115,026 square miles of the richest land on the globe." We do not deny that there is some very rich land in the Philippine Islands, but that it extends over the whole surface of these Islands is not in accordance with the facts, as it is well known the Islands are volcanic in character and in many instances of such contour that no cultivation is possible, and in many parts the soil is by no means rich nor to be classed as fertile. On the other hand there are great valleys made by the deposits from large rivers where the soil is deep and crops of great abundance and fine quality can be grown.

But the statement which commands our attention most forcibly is the representation that labor could be obtained for the sugar plantations at from 10 to 20 cents gold per man per day. In a separate part of this paper a correction of this is noted in which the chairman of the committee calls attention to the fact that the words "and subsistence" were omitted, which makes a very great difference, as one accustomed to labor conditions can readily see; but even with that correction people should realize the small amount of money necessary to supply laborers in the Philippine Islands with the frugal meals to which they are accustomed and not get an erroneous idea as to the cost of supplying laborers for the sugar plantations should they plan to start a sugar estate for themselves and on their own initiative. It is true that under the old régime where the laborers lived in a sort of peonage the prices mentioned and even less prices have been paid, but it is also true that when the time for handling the crop comes the sugar plantation owners have great difficulty in getting laborers at very much higher prices; that they have found it necessary to pay a bounty to laborers to come from other islands and even so contracted-for laborers have had a tendency to run away after getting their transportation free; so that the figures run up to many times that cost intimated in the committee's letter. These facts should be borne in mind by any person contemplating establishment of sugar industries in the Philippine Islands.

JAPAN'S GROWING MACHINERY TRADE

Japan continues to lead all other Farthest East countries in the purchase of foreign machinery. The three great machinery-producing countries of the world are the United States, the United Kingdom and Germany, and during 1905 they sold the bulk of these products that Japan purchased. The business exceeded $6,000,000 gold. A study of the Japanese *Year Book*, just issued from Tokyo, reveals a remarkable growth in the importation of this line of mechanical productions. Considering five of the most important items of import under this head—electric motors, locomotive engines, spinning machinery, steam boilers and engines and turning lathes—the United States sold products amounting to $2,813,800, Great Britain $2,414,500 and Germany $895,600. The balance of the trade was apportioned among other countries. Previous to 1896 Japan purchased no electric motors, and in that year only $7,000 worth, and not until 1900 was the $100,000 mark passed. The importation in the calendar year 1905 aggregated $1,227,700. Only $100 000 of locomotive engines were purchased by Japan in 1892, but for 1897 and 1898 the importations were over $2,000,000 for each year. In 1899 the importations fell off to $984,000, but for the past three years has always exceeded $1,000,000. The American and German locomotives are now gaining supremacy in Japan, where the British make formerly led. For six years previous to 1905, the sale of British locomotives averaged $500,000 *per annum* in Japan, but last year they dropped off to less than $150,000. The following tables show the Japanese importations of motors and locomotives for the last two years:—

ELECTRIC MOTORS

Country	1904	1905
United States	$ 406,000	$ 929,800
Great Britain	114,400	211,800
Germany	110,000	83,100
Other countries	2,000	3,000
Total	$633,000	$1,227,700

LOCOMOTIVE ENGINES

Country	1904	1905
United States	$ 177,000	$ 471,000
Great Britain	847,600	147,700
Germany	117,300	609,600
Other countries	3,000	4,900
Total	$1,145,600	$1,233,200

Steam boilers and engines from abroad came into Japan in 1892 to the extent of only $90,000, but the increase has been steady, last year marking the first step over the $1,000,000-line. The sales of American boilers and engines to Japan more than doubled the 1904 figures. In textile machinery the United Kingdom supplies the major portion of Japan's needs, as she does the other nations of the world. The United States, however, is beginning to export this class of products and sold to Japan last year $14,600 worth of spinning machinery. Japan's heaviest purchases of textile manufacturing equipment were in 1897, when $2,700,000 were thus spent abroad. The year 1892 marked the beginning of this trade by foreign purchase of $178,000 worth of spinning machinery. The importation of raw cotton that year was only one-tenth the quantity in 1905.

The introduction of turning lathes in Japan began in 1896 with $36,000 expenditure. This went up to $413,800 in 1904, nearly half the purchases being made in the United States. Great Britain and Germany then went after this trade, and succeeded in 1905 in selling lathes to Japan $591,800 and $126,800 of value, respectively. The United States, however, held her own, trebling the sales of the year previous. The Japanese importation of spinning machinery, steam boilers and engines, and turning lathes for the past two years was as follows:—

SPINNING MACHINERY

Country	1904	1905
United States	$ 9,400	$ 14,600
Great Britain	376,000	641,300
Germany	12,800	48,300
France	11,000	5,000
Other countries	5,900	400
Total	$ 415,100	$ 709,600

STEAM BOILERS ENGINES

Country	1904	1905
United States	$ 214,900	$ 447,000
Great Britain	626,300	821,900
Germany	8,000	27,900
France	4,200	10,800
Other countries	1,700	8,900
Total	$ 855,400	$1,674,800

TURNING LATHES

Country	1904	1905
United States	$ 290,400	$ 951,400
Great Britain	77,600	591,800
Germany	37,600	126,800
France	8,200	4,500
Other countries	....	300
Total	$ 413,800	$1,674,800

This includes all the machinery imports given by the *Year Book*, minor articles not being stated. The great strides of Japan in the manufacturing world are evident when it is considered that in 1892 the machinery imports amounted to only $367,500 gold; in 1900 they were $1,606,200; in 1904, $3,462,900; and in 1905, $6,161,800. Of this large trade America secured nearly 40 per cent, Great Britain following closely with nearly 32 per cent, and Germany taking third place.

MINING CONDITIONS IN MALAYA

In other columns of this issue we publish a most interesting and comprehensive description of the extensive tin-mining industry in Malaya, with a number of attractive illustrations reproduced from photographs furnished to us by M. Brochier, ex-Director of Mineral Exploitation of the Government of Indo-China.

Under the present régime, the British Protectorate over the Malay Peninsula controls the small states of Negri Sembilan, Selangor, Pahang and Perak, which form the Federated Malay States under the authority of the Governor of the Straits Settlements whose official residence is at Singapore. The present Governor is Sir John Anderson, K. C. M. G., who was appointed April 16th, 1904.

No geological data concerning this Malayan country has been gathered by the British Administration. Any official may be appointed as a supervisor of a certain mining district, his principal duty being to see that the streams of the small rivers of his region are not diverted from the purposes to which they have been assigned. Works up-stream must not be prejudicial to those down-stream, and waters can not be monopolized. Any infringement of the established rules is punishable by heavy fines or by cancellation of license. From such severe regulations it very often follows that a poor stream is all there is for the working of several mines. A Government engineer is placed at the head of all the mining supervisors, and the administration of his department is generally admirable, everything being done to facilitate prospecting, be the prospectors of any nationality whatsoever.

At the head of each of the Federated Malay States is a Resident, besides a few other heads of departments, a magistrate, a collector, etc. The Resident is always an official who has begun his career as an humble civil servant, and when he is called to administer the State he is thoroughly acquainted with the language, customs and manners of the people, not to mention the industrial and commercial resources of the land. In every residency is kept a mining register always open to the inspection of prospectors. This register shows:

(1). The parcels of land which may be conceded by the Government. In countries under British rule everything is methodical, so no mining concessions are granted to work the mountainous region before work in the lower regions has been thoroughly developed.

(2). No mining concession is granted where Government forests exist. The Department of Forestry is very efficient. There are to be seen immense virgin forests, cleared of all plants and trees that have no industrial value. Nothing remains but gutta percha trees and trees that will give the best wood for building purposes, for cabinet work, etc.

(3). The mining concessions already granted, their area, dates of the grants, work done therein, and results of official analyses of samples are recorded.

(4). The work under way, number of coolies employed, and the quantity of tin sold are carefully noted. The selling of tin is under severe control. Every body can not be a purchaser of the metal, a special license being granted for such a purpose and the Government reserving for itself the right to inspect the books.

(5). Few conditions are imposed by the Government for the grant of concessions, but the law has made these conditions absolute. This policy has, during the last years, attracted capital from Germany, Belgium, Australia, America and France, not to speak of British home investments. All concessions must be thoroughly developed within six months after their grant and titles are valid for 25 years. It is thus impossible to retain a concession without working it, and the restriction is made with the sole object of preventing mining-land speculation.

A mining concession in the Federated Malay States gives rights to the extraction of any metal or mineral found on or under the surface of the ground, and to install the necessary machinery for preparing the mineral for the market; the use of the needed land on which to erect houses for the miners, workshops, etc., and also of agricultural land for the cultivation of vegetables and plants necessary for feeding coolies; the exclusive use within the limits of the concession of all the products of the soil such as wood for building and for fuel, rattan, etc., provided same be used for the needs of the concession.

Collectors may grant titles to concessions of not more than 25 acres. For concessions exceeding this acreage but not exceeding 200 acres titles are granted by the Resident of the State. Titles to concessions larger than 200 acres are to be obtained from the Governor-General. For small concessions applications are made to the local authorities forwarding at the same time an approximate map of the concession applied for. If, prior to the application for a concession, the prospector feels doubtful as to the location of a deposit and is thus unable to limit the size of the concession he wishes to obtain, and if he fears to carry out the necessary prospecting work in the presence of his rivals, he may apply for a *permit license* to prospect 500 acres. This permit is always granted and the fees collected for same amount to $25. This precautionary measure will protect the prospector for a period of six months, this time being sufficient for him to locate a deposit and to fix the limits of the concession he desires to apply for.

The minimum number of coolies to be engaged is eight per acre.

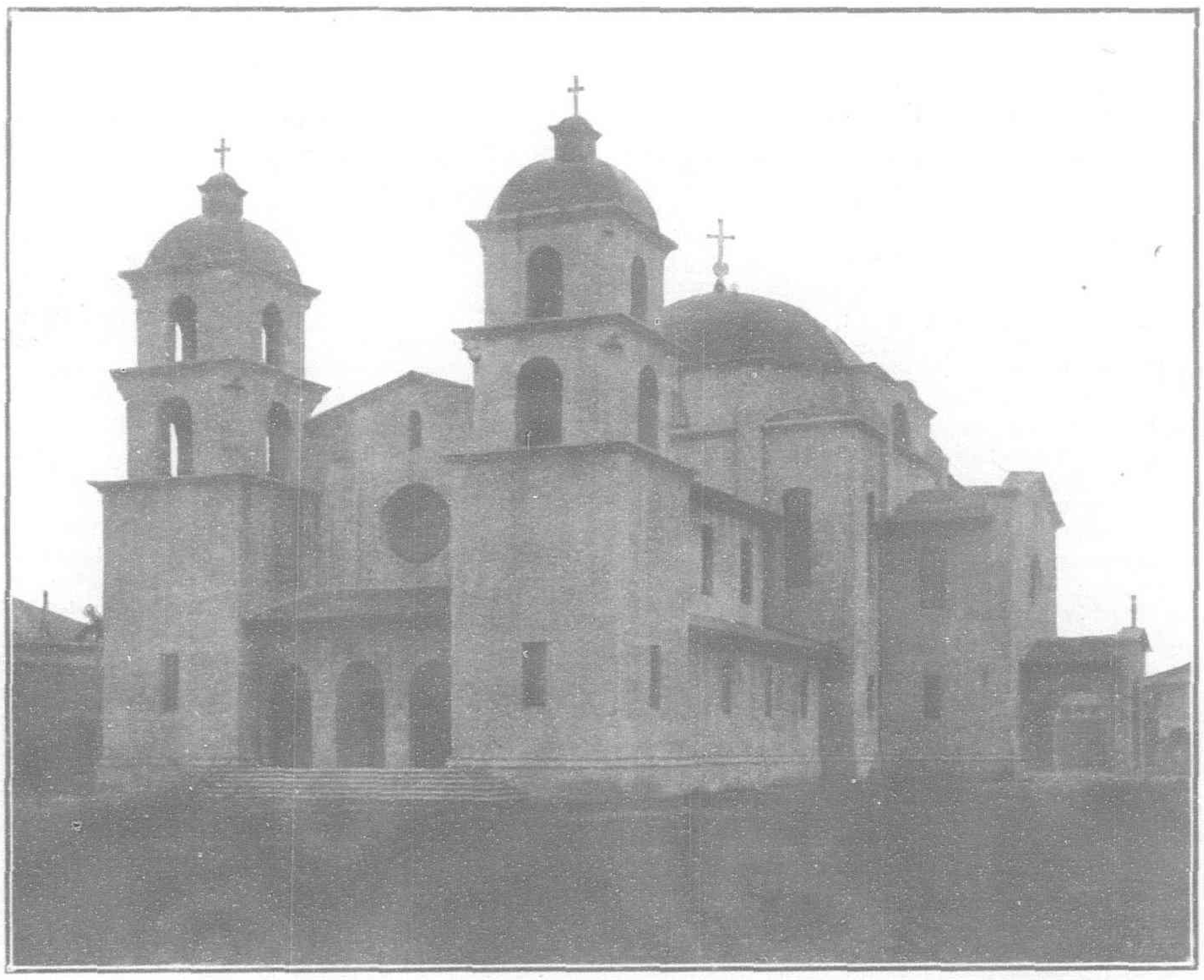
Prospectors may also obtain from the office of the Resident a map showing in detail the roads, byways and routes of the State. On this map are indicated all the *rest-houses*. These rest-houses are solid stone or wooden buildings containing about 10 bedrooms well furnished with iron bedsteads and spring mattresses, wardrobes, dressing tables and irreproachably clean linen, etc. A large room is used as a dining room and provisions and wines of all kinds are kept in stock. The price of a room is about 75 cents gold a day, and each meal is charged 37.5 cents gold.

There are some regions, such as the old states of Pahang and Negri Sembilan, where the life of prospectors is not absolutely safe. Where there is danger, posts are erected on which the following is visibly written:—"Limit of protection. The Government assumes no responsibility for travellers who go beyond this limit without previous notice being given to the authorities."

We have cited these most important features of the mining laws of the Federated Malay States to give the reader a better idea of the control by the Government of the tin industry, and to more clearly inform other governments of Oriental countries on the best features of the Malayan laws with respect to the protection or promotion of general mining enterprise.

VACANT COMMISSIONERSHIP

Now that President Roosevelt has withdrawn the appointment of Judge Magoon as Vice-governor-General of the Philippines, the United States insular Commission is again minus one member. Whether there are any candidates in the homeland for the position we are unable to say, but we earnestly hope the President will not look in that direction for the selection of the new commissioner. We believe Mr. Roosevelt should name his man from among competent Americans who have resided in the Philippines and whose experience in governmental affairs has educated him up to local conditions and the needs of the Islands. During the recent assembly of provincial governors in this city, these officials unanimously recommended the Hon. Arthur W. Fergusson, Executive Secretary, to the President for the commissionership. We believe Mr. Fergusson is the candidate best qualified for the position. He has been Executive Secretary to the Commission ever since Mr. Taft and his colleagues inaugurated civil government in the Philippines, and in this capacity has developed not only a remarkable and intimate knowledge of insular conditions, but has demonstrated by profound ability his fitness for greater responsibilities. Mr. Fergusson is possessed of every qualification for an ideal commissioner, and we believe he deserves all the consideration at Washington that is being petitioned for by his friends in the Philippines. If faithful service and close application to Government interests speak for anything, Mr. Fergusson merits this reward. We think he should have been appointed to the Commission long ago, yet if his promotion comes even at this late date we know the President's long-delayed recognition of his merits and ability will strike an unanimously responsive chord in the hearts of the people of the Philippines.



WEST OR MAIN ENTRANCE, SHOWING BELL TOWERS

REINFORCED CONCRETE IN THE CATHEDRAL CHURCH OF ST. MARY AND ST. JOHN, AT MANILA

(Continued from page 175.)

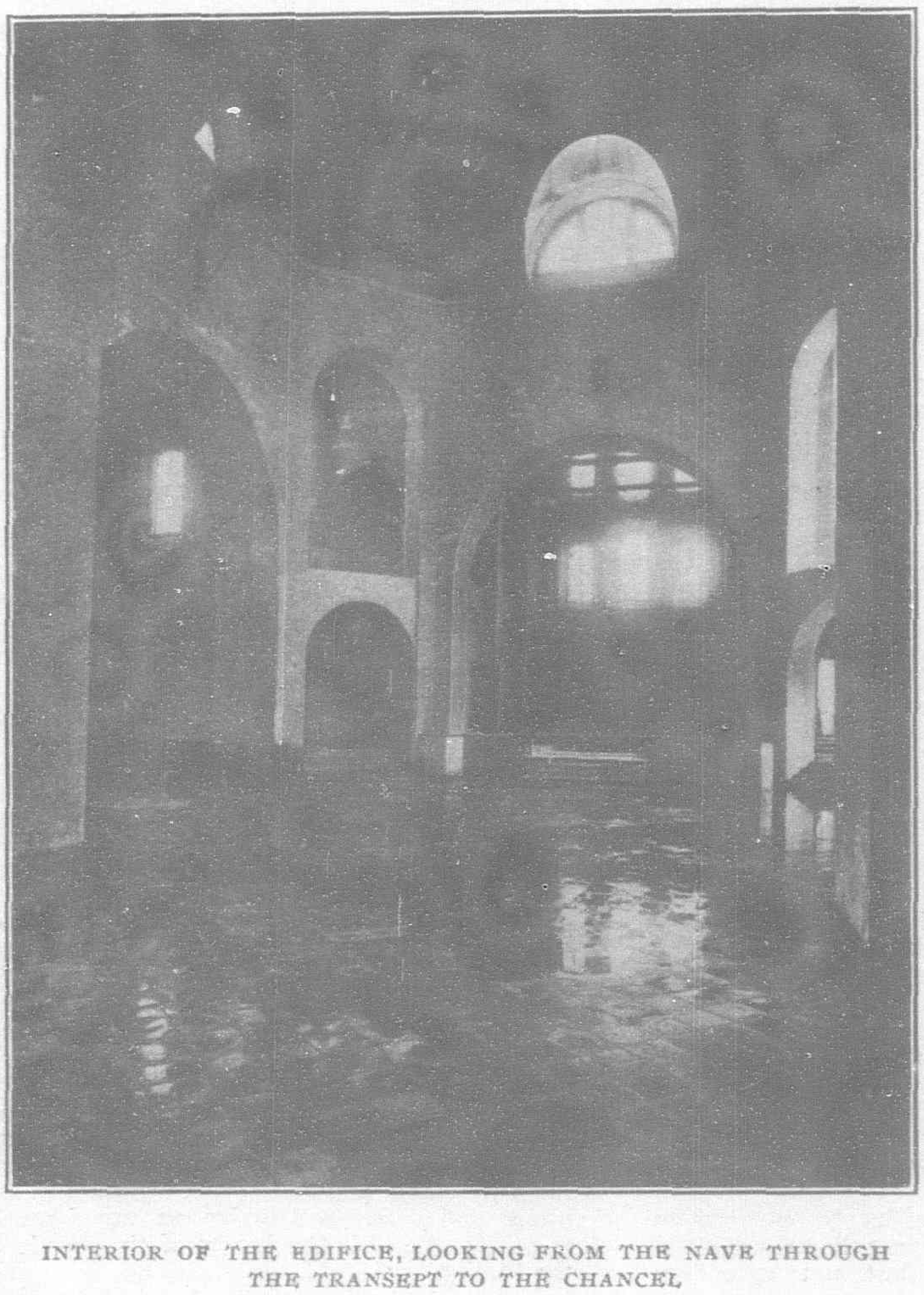
ness of the Renaissance, there is added a suggestion of the more soaring quality of the gothic. As the plans were revised from time to time, they were more and more simplified until the lines which now appear in the completed building were finally evolved. The edifice is intended to gain its distinction from its massiveness and simplicity.

DIMENSIONS AND ARRANGEMENT OF THE BUILDING.—The edifice is cruciform, with dome, and towers on either side of the main entrance. It is spacious, having seating capacity for about 1,000 persons. The main building is 60′ in width over all by 180′ in length, while each wing is 22′ long by 18′ in width. The building proper is 44′ in width. The height of the dome is 76′ above ground-level. It is octagon in shape and measures 50′ in diameter over all. The dome is a steel truss covered with copper. The towers are each 18′×18′ and 57′ in height. Inside of each tower is a circular steel stairway leading from the floor to the cap, which is also covered with copper, secured on wooden frames. The nave proper is 53′ wide over all by 123′ long. The chancel contains the choir vestry, sacristy, above which is the organ loft; the clergy vestry on the north side and a morning chapel on the south side. It is 80′ in length over all by 52′ wide. The ceilings of the nave and chancel are box-panneled. The interior effect of the nave and wings is a mass of arches with a span 28′ in width for the main arches.

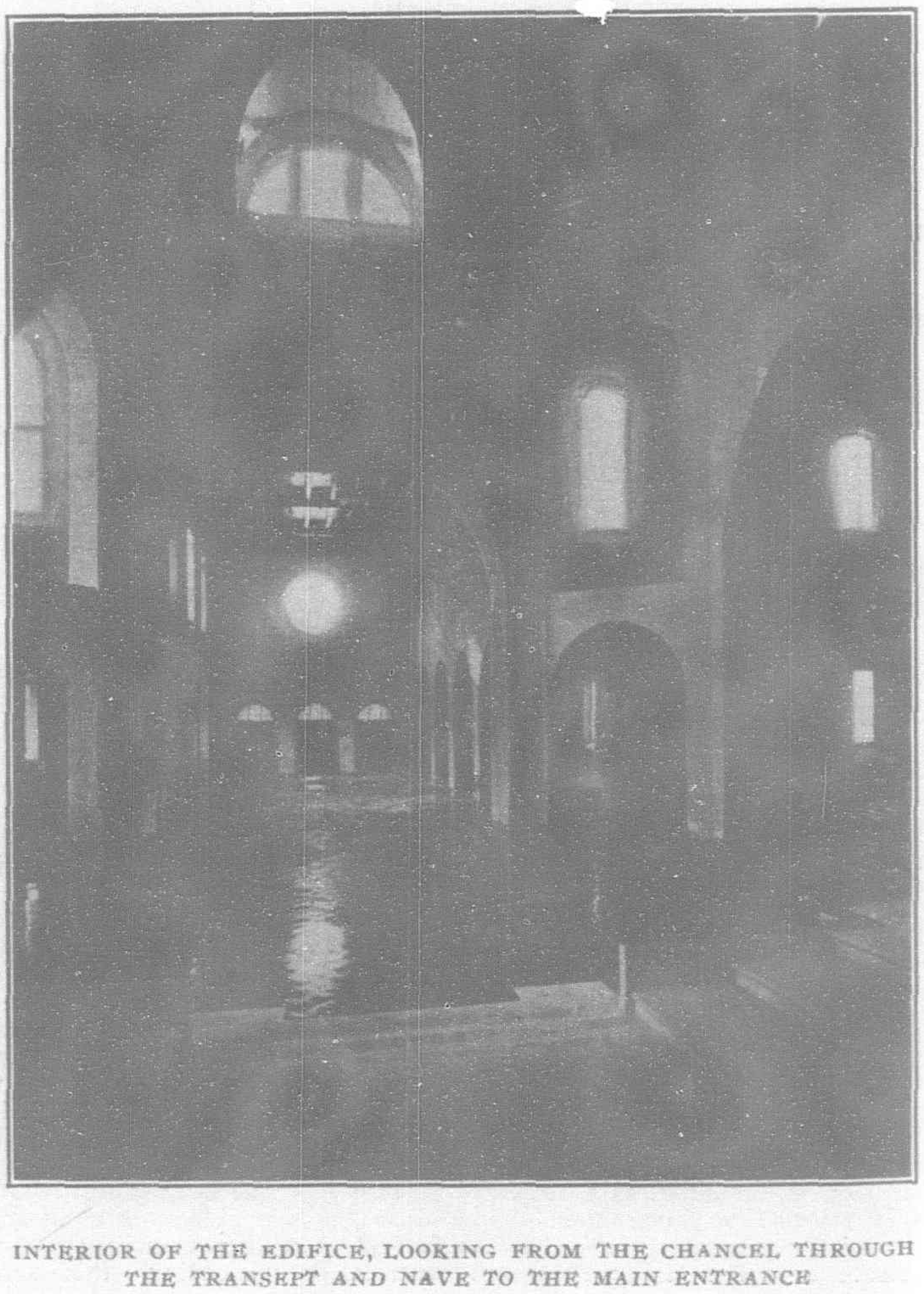
The main roof is supported by heavy wooden trusses covered with flat locking roof tiles, and all gutters, downspouts and incidentals are of copper. The floor throughout is of Philippine cement tiling and all the doors are of native *molave*, a beautiful hardwood, with massive brass trimmings. There is a large porte-cochère at the south entrance to the church.

ABSENCE OF DECORATION.—The interior is devoid of decoration, and it is not the expectation of Bishop Brent to do anything more with the walls than give them a proper tone at such time as the efflorescence has ceased. Stained-glass windows may at some future date be added, but the experiment of using translucent shells set in *molave* frames is an artistic success. Not only does this simple style fit in with the domestic architecture of the country, but it has a distinct kinship with the ground-glass, diamond-pane windows to be found in European cathedrals.

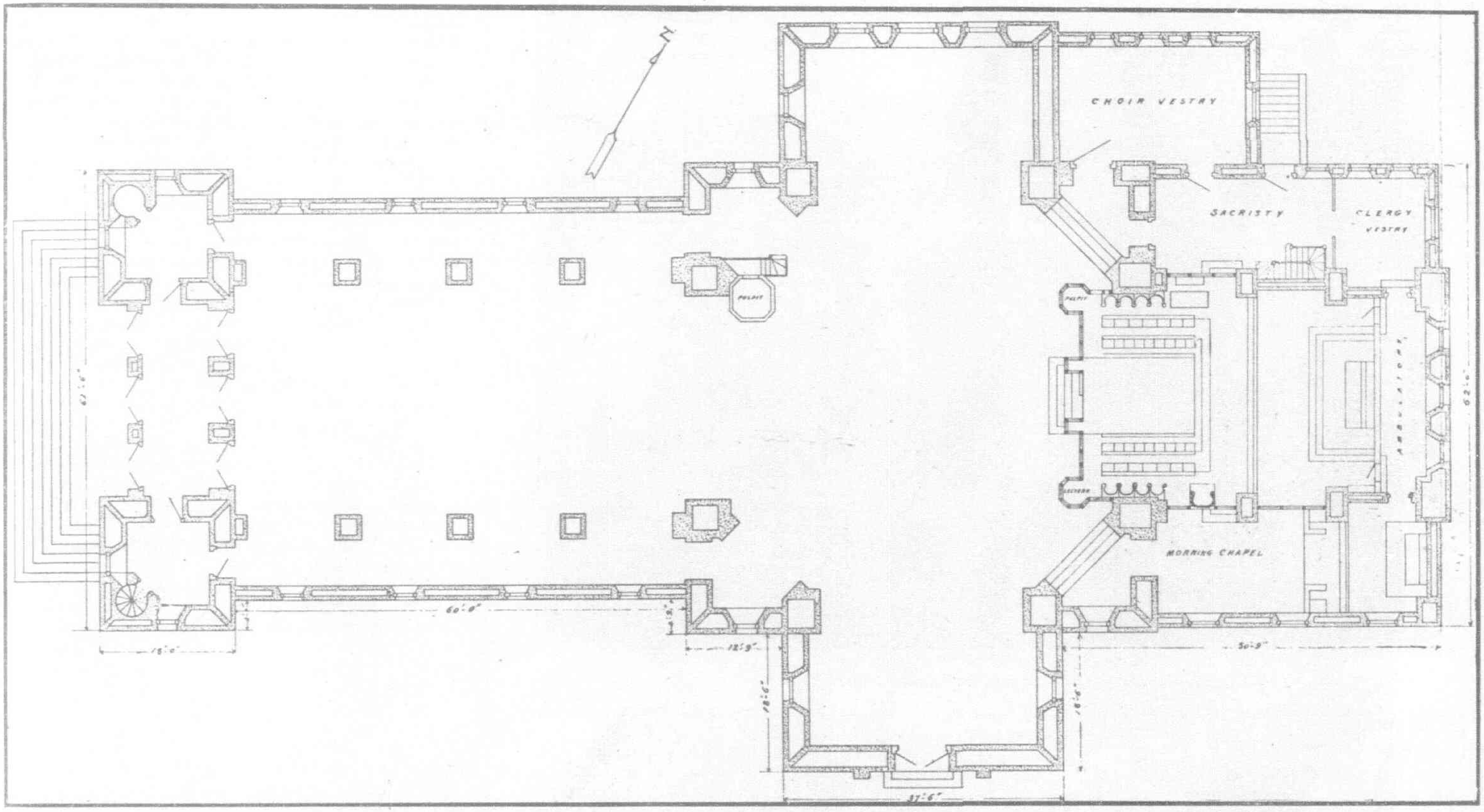
There are no pews, but deal chairs with wax finish, made according to a special design by



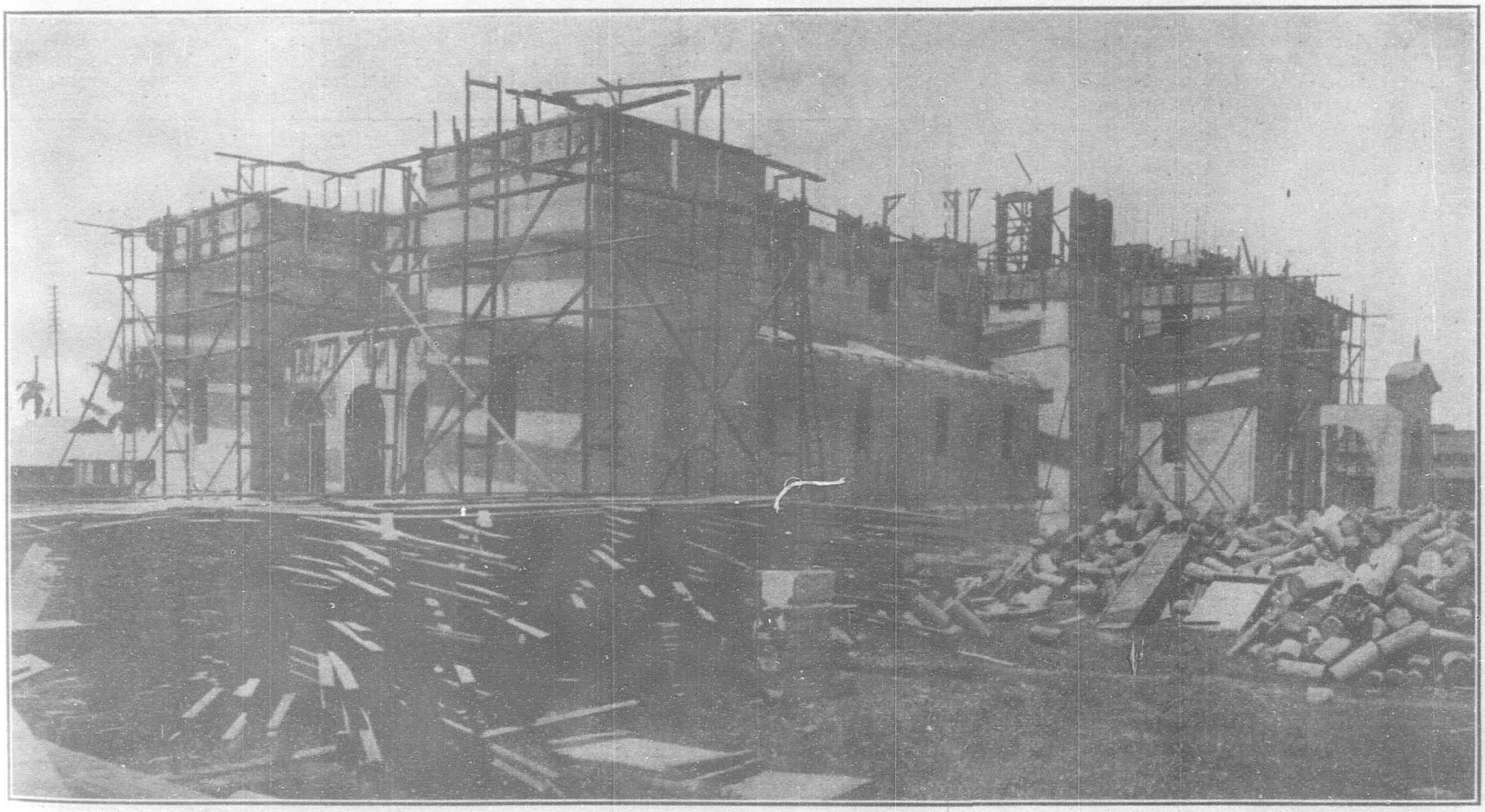
INTERIOR OF THE EDIFICE, LOOKING FROM THE NAVE THROUGH THE TRANSEPT TO THE CHANCEL



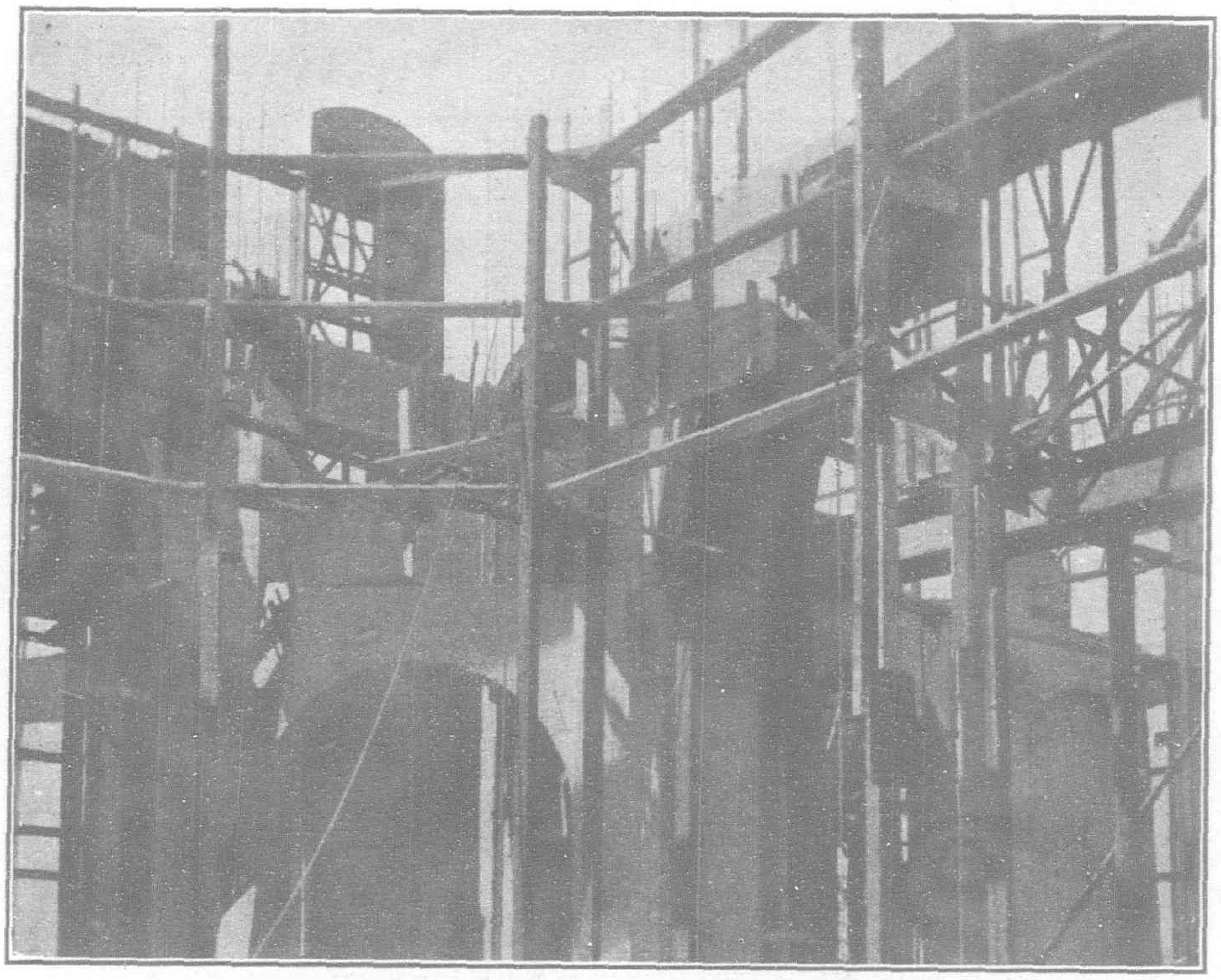
INTERIOR OF THE EDIFICE, LOOKING FROM THE CHANCEL THROUGH THE TRANSEPT AND NAVE TO THE MAIN ENTRANCE



FLOOR PLAN OF THE CHURCH, FROM ORIGINAL BY MESSRS. STURGIS & BARTON, BOSTON



GENERAL VIEW OF THE CONSTRUCTION AFTER IT WAS WELL UNDER WAY



INTERIOR OF THE EDIFICE, SHOWING ARCH CONSTRUCTION

Messrs. West & Collier, of Henley-on-Thames, England, afford the seating accommodation required.

The font, which stands at the end of the south ambulatory at the entrance of the transept, is a magnificent piece of Italian work in white marble. It was cut in Rome by Ernesto Amadeo after an ancient Byzantine model in St. Paul's Episcopal Church. The design is symbolic, representing on the respective faces of the basin the lion's head; the pelican; a griffin devouring a fish; and two birds eating a cluster of grapes. The basin is set on six columns with spiral lines, surmounted by a frieze on which a vine is cut; the whole stands on a spacious marble base. This font was the gift of St. Anne's Chapter of Domestic Missions, Church of the Heavenly Rest, New York City, in memory of its President, Olive Wilmot Sanford.

The small morning chapel to the right of the choir will contain a memorial altar of carved *akle* with ornaments, also given by a friend in America. The designs for the choir furnishings are not yet executed. These likewise are the work of Messrs. Sturgis & Barton, of Boston. A rood beam is to span the choir arch at the height of 20′ from the floor of the nave. A low screen of native wood is planned for the entrance into the choir. The pulpit and lectern, both of which are memorials, will be worked into this screen. The choir stalls are to be of Philippine hardwood and of simple design, massive, with carved figures at the end of each. The clergy sedilia are according to conventional form. The plan for the bishop's throne is elaborate and frankly gothic, with a canopy and screen. This will stand at the south side of the choir in the open arch between the morning chapel and the choir.

The altar rail is to be of native wood on brass pilasters, and is the gift of the Woman's Auxiliary of the parish. The altar itself is likewise to be of carved native wood, and is to be in memory of Major John A. Logan. Eventually there will be a reredos of the same material covering the whole extent of the concrete curtain which now separates the sanctuary from the east end of the church.

The organ, which is the gift of Mrs. J. Montgomery Sears, of Southborough, Mass., donated in memory of her husband whose purpose had been to give this in conjunction with his daughter, is to cost $10,000 gold. It is now in the hands of Messrs. J. W. Walker & Son, London, who are the builders.

It is the desire and expectation of those in charge of the property to beautify the grounds which surround the cathedral, planting them with trees and shrubs and laying out such walks as may be necessary and effective.

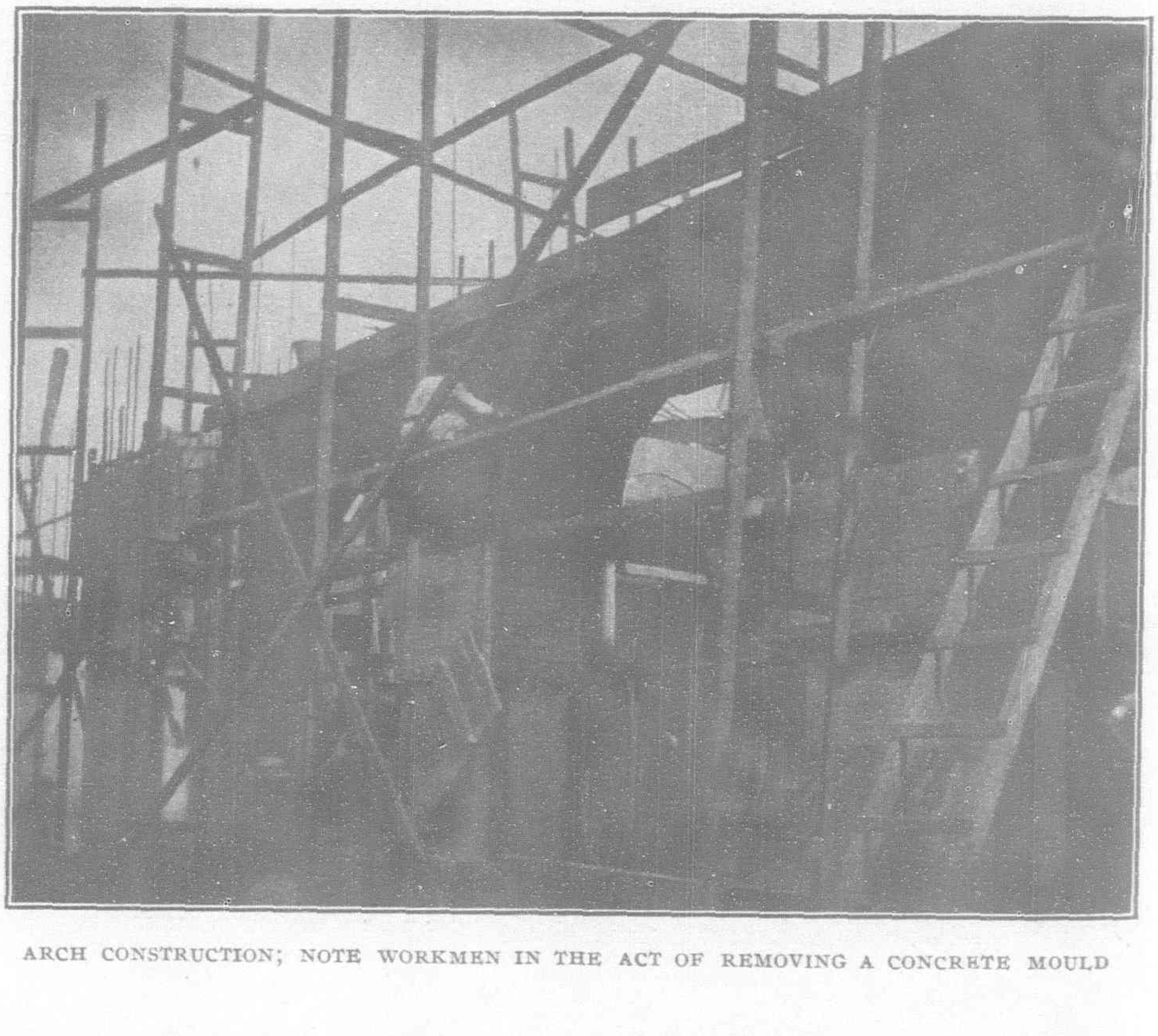
The cross which surmounts the dome was originally on the Convento de la Santissima Trinidad, Granada, Spain. It was bought by the donor of the cathedral and sent out here to be erected in place.

The towers are to hold a chime of eight bells, given by different persons and groups of persons; among them being one in memory of General Egbert, given by his family; another in memory of the officers of the Corps of Engineers, U. S. Army, who fell in the Philippines, and a third by various officers and men of different regiments in memory of fallen comrades. The bells are to be cast in Germany by Messrs. Petit & Edelbrock Bros., of Gescher, Westphalia.

DETAILS OF THE CONSTRUCTION.—About 650 piles were utilized in the foundation, being driven to a depth of from 20′ to 25′ below gradeline. They are of sound timber and none of them are less than 8″ in diameter at the small end under the bark, and not less than 12″ at the butt. Each pile was driven to solid bearing so that it was capable of sustaining safely a load of 10 tons. Piling in addition to that in the foundation proper was driven under the steps leading to the west entrance and under the altar. The piling was imbedded in solid concrete, and upon this was built 5½′ of foundation proper, having an average width of 5′. The floor itself was filled in and rammed; then there was laid 1′ of concrete, on top of which rest the tiles. The foundation is a solid wall to the water-table, and from the water-table up to the roof the walls were built on the mould system in cavity form, or 2′ to 3′ 6″ from outside to outside, the thickness of the walls being from 6″ to 8″ with the cavity between. The hollow or inner core was constructed of wood incapable of taking up moisture from the concrete and certain later on to shrink away from the enclosing concrete shell These inner forms were left in the walls. The outer forms were made more carefully and were removed from stage to stage as the work of construction progressed. All cement used below water-table was mixed in proportion of 1, 3, 6, and that for the walls 1, 2, 4, crushed rock being used throughout in the concrete.

All rods used to reinforce the concrete walls, arches, slabs, etc., are of mild steel with an elastic limit of not less than 30,000 lbs per square inch and capable of bending cold to a diameter equal to thickness of the piece tested. At all intersections of arches, columns, openings for doors and windows are concrete partitions for the purpose of interlocking the walls, the reinforcement throughout the entire building being horizontal rods ½″ in diameter and spaced 6″ on the center. They are securely tied to vertical rods by means of galvanized wire. The vertical rods are so spaced as to be placed at every intersection of a partition and around all openings for doors and windows. The vertical rods in the columns are ¾″ in diameter and are spaced 1′ on the centers. The arches are all of cavity form and the solid concrete stairway leading to the organ loft is massive and properly reinforced.

CORNER-STONE.—The corner-stone, which is a block of Mariveles granite, was laid with appropriate ceremonies on January 25th, 1905, and the first service in the complete building was held in the evening of October 28th.



ARCH CONSTRUCTION; NOTE WORKMEN IN THE ACT OF REMOVING A CONCRETE MOULD

"GERMINAL" CIGAR AND CIGARETTE FACTORY, MANILA

With the close of the present year, the "Germinal" Cigar and Cigarette Factory reports a large increase in business, particularly in its export trade. The "Germinal" is a strictly Filipino company and the success of the enterprise is in a large measure due to the business ability of Dr. Ariston Bautista y Lin, President of the Board of Directors, and the progressive policy of Sr. Mauro Prieto, General Manager of the factory. These gentlemen work in harmony with the board, other prominent members of which are the Hon. T. H. Pardo de Tavera, a member of the United States Philippine Commission; V. D. Fernandez, the Hon. Gregorio Araneta, Attorney-General for the Philippine Islands, and Sr. Justo Guiedo.

The "Germinal" Cigar and Cigarette Factory, which was established in 1898, has grown steadily since its foundation and is today one of the largest and best equipped manufactories of its kind in the Philippines; it excels in every way any other establishment in this line of business in the Far East. With its numerous machines it is turning out an immense quantity of the very finest brands of cigars and cigarettes that the best selected native tobacco and skilled workmanship can produce. The demand for the "Germinal" products is so great at the present time that the factory is tried to its utmost capacity. To relieve the business of this strain and provide for future needs the Board of Directors has now under consideration large plans for the extension and enlargement of the factory. It is believed that within another year its capacity will be practically doubled.

The factory is divided into five sections. The ground floor gives accommodation to the offices and cutting appliances where the leaf is sorted, selected and properly distributed, and where the boxes for packing the finished products are manufactured. The other sections are utilized in the manufacture of the numerous grades of cigars and cigarettes that find their way into the markets of the Philippines, the European countries, China, Japan, the Straits Settlements, Australia and numerous other foreign colonial possessions in the Orient.

It requires an entire city block for the site of the "Germinal" factory, which is a 3-story building. The structure is handsome in architecture and stands at Calle Marques de Comillas and the Ayala Bridge.

"GERMINAL" CIGAR AND CIGARETTE FACTORY, MANILA

A CORRECTION

AMERICAN CHAMBER OF COMMERCE, Manila, P. I. *(Office of the Special Tariff Committee)*, November 16th, 1906.—Editor, THE FAR EASTERN REVIEW:— With reference to the circular letter of October 20th, issued by this committee, which was inserted in the last (October) number of your journal, attention is invited to an omission which has come to our notice. On the third page of the letter, following the words "twenty cents a day," the words "and subsistence" should appear. With this cost added the outlay for labor on sugar plantations will average from 20 to 40 cents gold per man per day.

In regard to the statement in the same letter that the Philippine Islands "have an area of 115,026 square miles of the richest land on the globe," we wish it understood that this statement is used in a comparative connection and must be considered in that form. No person should be so short-sighted as to infer from the statement that it is intended to convey the idea that all of this land is available for cultivation. The Philippines have their quota in large measure of mountains and a large proportion of forests, all of which is included in the total area.

We would also call attention to an error which was made in referring to the estimated expenses of the Government. The disbursements for the insular Government and the City of Manila, for the fiscal year 1904, were $14,522,597; for 1905 they were $12,800.342, while for 1906 the reports will show when published, expenditures of approximately ₱16,000,000, equal to $8,000,000 U. S. currency. The error occurred in the letter in confusing pesos with dollars.

Trusting that you will give due prominence to this letter, in order that any erroneous impression may be corrected, I am,

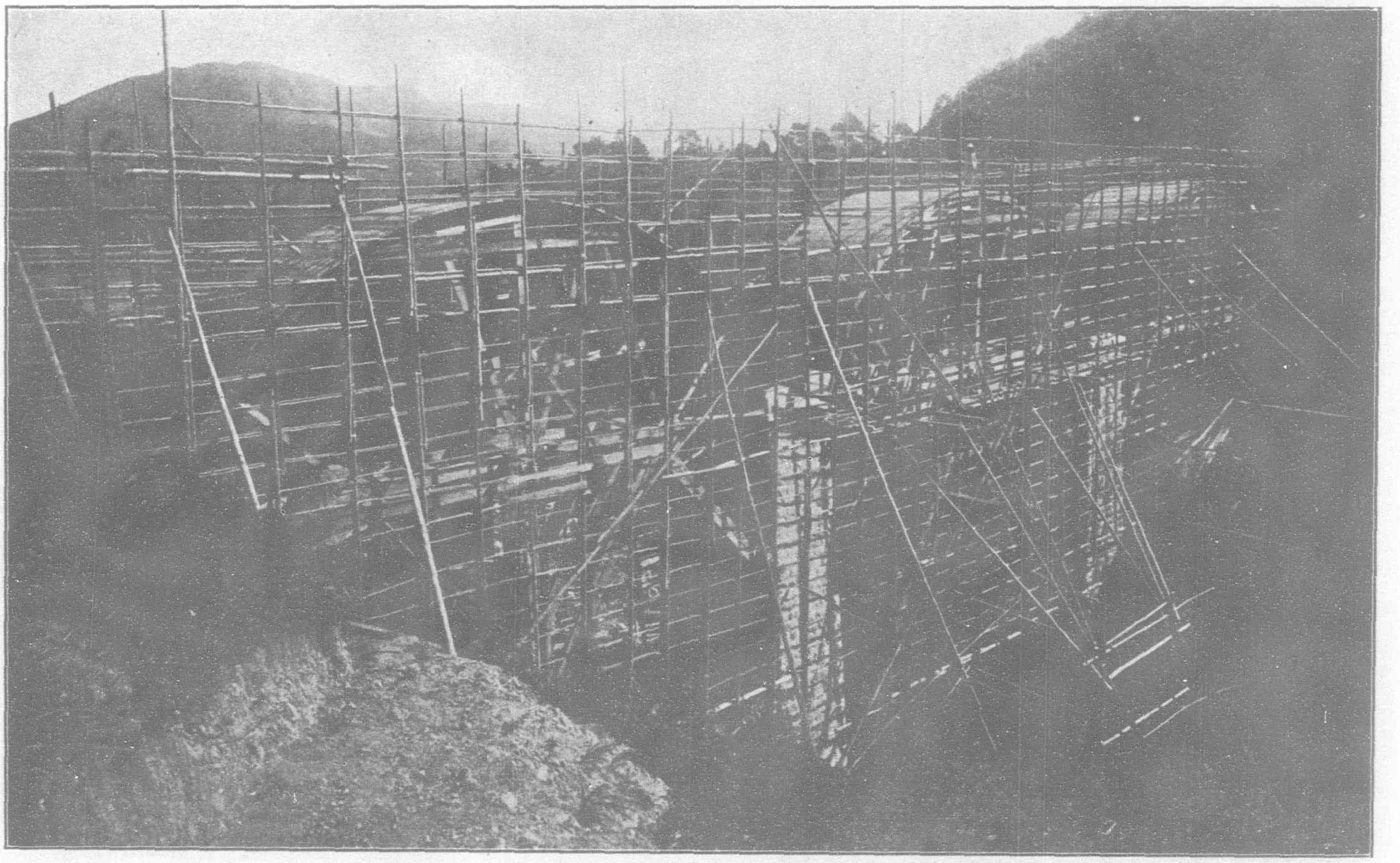
Respectfully,
(Signed) HAROLD M. PITT,
Chairman of the Committee.

TYTAM WATERWORKS EXTENSION IN THE COLONY OF HONGKONG

At the present time the residents on the Island of Hongkong labor under several disabilities, one of the worst being the uncertainty of the rainfall; another the limited dams in which to store the water when it does descend.

For many summers it has been necessary to put the residents on short supply for a month or so until the reservoirs are augmented, but soon this practice will be entirely done away with. The Government is now building dams on the opposite side of the hill on which the City of Victoria stands, and these constructions form the subject of this illustrated sketch.

Scheme and its Engineering Features.—On March 16th, 1904, a scheme was undertaken to establish two necessary dams and other works below Tytam, which, it was estimated, would hold 1,400,000,000 galls. of water, drained from 2,000 acres of hills and dales.



ONE OF THE BRIDGES TO CARRY PIPELINE OF TYTAM WATERWORKS EXTENSION, NOW NEARING COMPLETION

The chief of these dams, which is to be at sea-level, and the other, some 200′ above sea-level, will both be connected by lines 18″ pipes with the present tunnel entrance at Tytam—400′ above sea-level, up to which all the water will be raised by pumping.

This is the task that is now being carried out. One large dam is nearing completion and the other will soon be begun, and to make them useful to the residents lines of pipes have to be carried over rough hills and deep gullies, a distance of 2 miles and rising 400′.

Pipe-Laying an Engineering Problem.—The laying of the pipes themselves is an engineering feat worthy of particular notice, to say nothing of the storage dams being constructed at the end of them. Great cuts have to be made in the hillsides, huge bridges have to be built over the gullies, and stout retaining walls have to be brought into requisition here and there to sustain a level. There are four bridges on the route and all are almost completed. The largest is 40′ high, with three spans of 50′; the next is 60′ high, with three spans of 20′ and one of 30′; a third is 30′ high, with two spans of 20′ and one of 30′ and a fourth bridge is somewhat smaller. All these structures are fine specimens of work. They are granite faced with concrete arches, and are built with a width of 15′, and, if anything, add to the picturesqueness of the rugged scenery encompassing them.

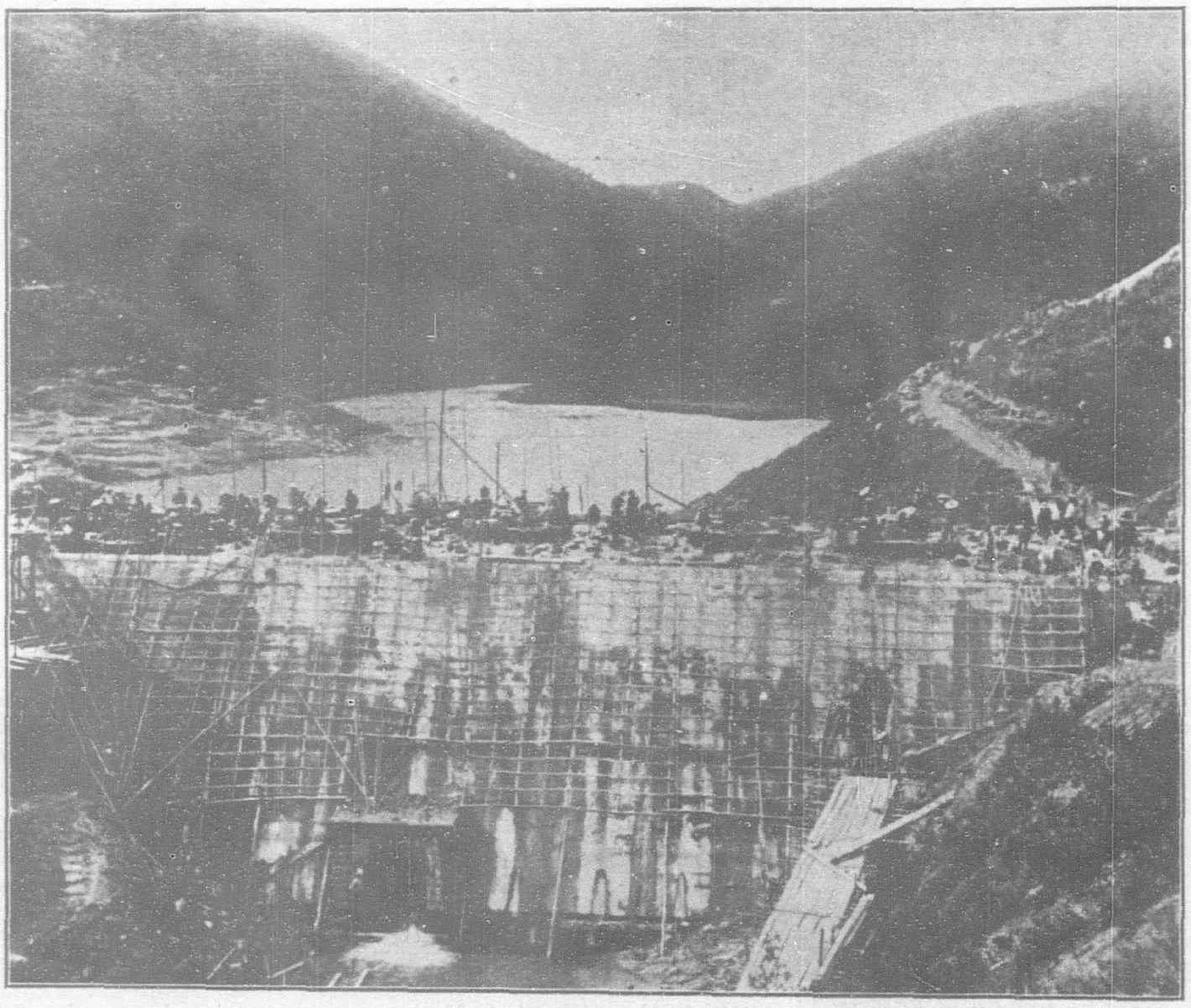
When these bridges are completed, when the cuts that clip edges off frowning hills and dip through belts of amorphous flinty shale, and anon through beds of clay, are trimmed, and when the road surface is laid over the lines of pipes that now looks snake-like as it creeps from sea to crown of hill, one of the finest roads in the colony will be open to public use. It will be 10′ wide, and will be ready to accommodate another line of mains whenever exigencies demand it. At present more than 2 miles have been laid—being placed on concrete pillars where the bed is soft—at a uniform depth of 3′ under the surface of the roadway. In this particular work every precaution has been taken to avoid any delay in the event of the necessity arising for two lines of mains, provision having been made for receiving the pipes, and all that will be necessary when the time for extension arrives will be to remove the earth and place the pipes in the bed already dug for them.

Chinaman as a Pipe-Layer.—On these works the skill of the Chinaman as a pipe-layer has been demonstrated. At the outset the Celestial could not appreciate the necessity of having a true level or a straight line. His idea was to throw the pipes together any way. Later on he saw things in a different light, came to a better understanding with the pipe, and began to lay the mains in a manner that would redound to the credit of the expert white man. He transports pipes up grades that would make the white man quake. Some 16 or 18 of him, with bamboo and rope, lift the massive main and carry it wherever it is needed. He smiles during the operation but in similar situation what would the white man do? Most likely he would sweat and fume and vituperate, and want to strike every day or so for higher wages and lesser working hours if something or other was not made to his liking. As a toiler John Chinaman needs a little pampering but not quite so much as his more enlightened and superior white brother. He is working there at Tytam in various capacities very strenuously. Whether dam-building or road-making, pipe-laying or bridge-building, engine-fitting or house-making, he shows equal capacity, capability and energy, and with the aid of 900 of him, his women and children, the vast work is progressing rapidly and is gradually absorbing the funds that Governor Sir Matthew Nathan is so carefully harboring with the object of having the scheme completed as soon as possible.

Progress of Dam Construction.—So far, as has been said, the pipe line is getting towards completion—at least the heaviest part of the work is done—and next come the dams. In this direction the intermediate reservoir—the one 200′ above sea-level—is almost completed. The crest of this dam will be 90′ above ground-level, and when completed will impound 200,000,000 galls. of water.

The completion of this dam and its permanent connection with Tytam will see the first of the new scheme finished, and that being made ready for use the second section will be gone on with. This consists of the construction of a huge dam at the sea-level to impound 1,200,000,000 galls. of water. The dam will cut across the head of the bay at a height of 60′ above low water, and with foundations going down to about 70′ below low water, and will uphold a vast lake.

Pumping Station.—The house for the pumping station has been built on the water side of Tytam Bay, and the boilers have already been installed. Workmen are now busy in preparing for the engines, and in connecting the furnaces with the chimney stack that has been erected on the hillside.



CONSTRUCTING THE INTERMEDIATE DAM AT TYTAM

There will be two separate engines, each being capable of pumping 1,250,000 galls. of water a day up the 400′ to Tytam tunnel. This is a great lift for such a quantity of water, so it can be seen that the very best engines have been procured.

In addition to the actual work on dam construction and pipe lines, there has been a vast deal done on the remote hills in the way of making catch-basins, but at present those all convey water to the original Tytam reservoir. Almost every hill in sight has been seared by drains, some of them passing along hills, uncommon steepness.

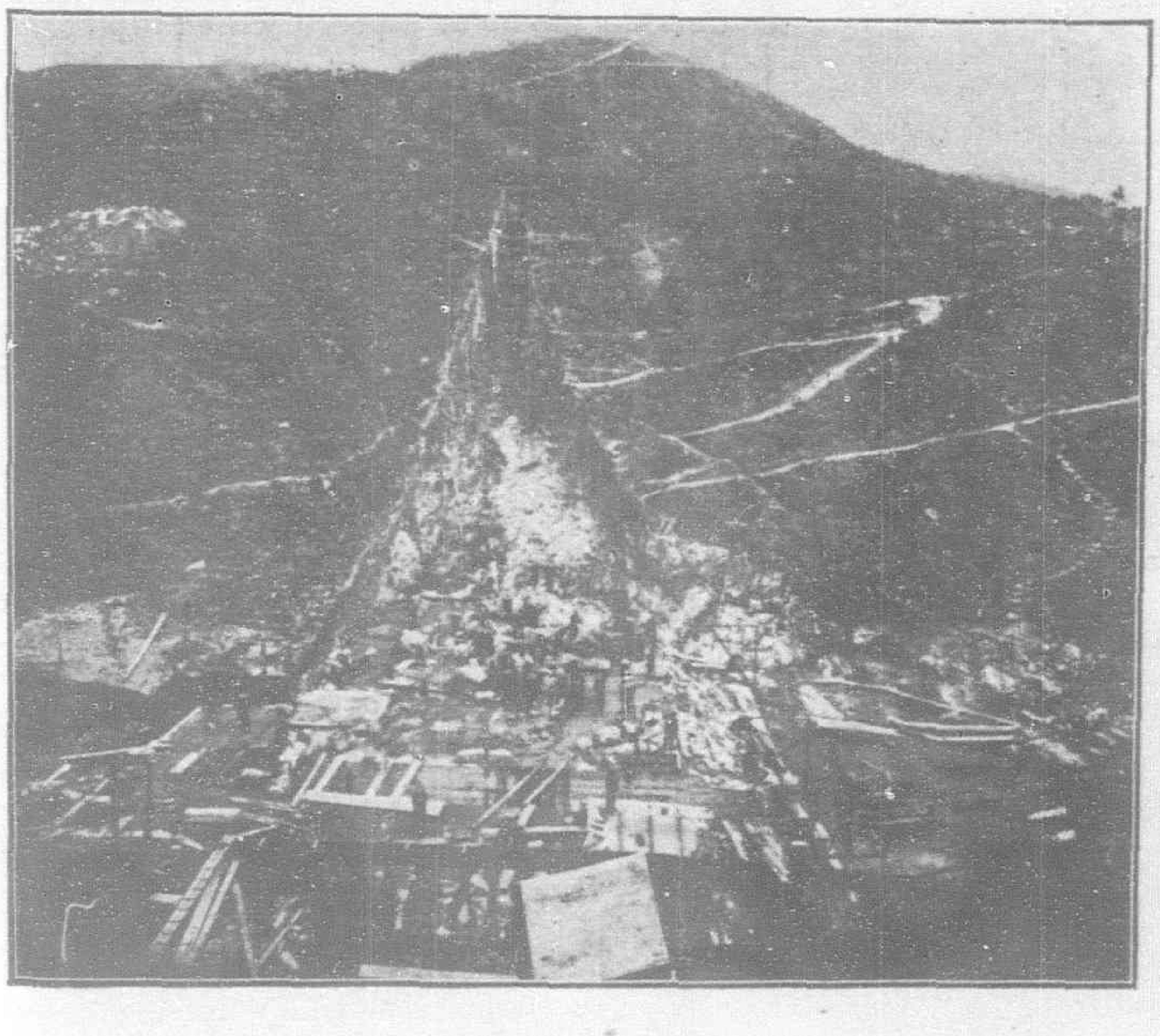
MAGNITUDE OF THE WORK.—The magnitude of this work near Tytam can not be gauged without a personal inspection of the improvement. The Government is spending a vast sum of money on the scheme, and the work is being carried out in a manner that reflects high credit upon the Public Works Department, of which Mr. W. Chatham is the head. Mr. D. Jaffé, of the department, is in immediate charge, and what is done by him shows thoroughness as to detail.

It is necessary, in order to make it clear to the reader how the new scheme is to fit in with the existing one, to traverse some old ground. At present the colony is being supplied with water from four reservoirs. The oldest one is at Pokfulum, which holds 66,000,000 galls. of water; the next to be built was at Tytam to hold 312,000,000 galls., and which was completed in 1889. Later an extension was made to this reservoir, resulting in the impounding of a total of 804,000,000 galls., the water being conveyed by a tunnel 1¾ miles long to Bowen-rd, and thence to the filter beds near the Peak tramline. The water flows through the tunnel by gravitation, and it is into this tunnel that all the water from the reservoirs now being built at Tytam-tuk will be pumped, so that it will eventually find its way to the Bowen-rd filter beds, which are being enlarged to meet the great pressure that is likely to be placed upon them. Other dams that contribute to the public demand are the Wongneichong dam, completed in 1900, which holds 33,000,000 galls., and the Tytam bywash, completed in 1904, which holds 20,000,000 galls. These fail to meet the present average consumption of about 5,000,000 galls. a day, and so it has sometimes been necessary to enforce an intermittent service; but it is hoped that the increased supply being rendered available and the application of the Rider main system—recently introduced—will obviate the necessity of cutting off the supply from European houses in the future. The Rider mains apply solely to Chinese houses, and allow a full supply of water in case of fire, and an uninterrupted service to white dwellers on the islands.

REINFORCED CONCRETE

Major-General Leonard Wood, commanding the Philippines Division, has recommended to the War Department at Washington that all military post quarters, barracks, and other buildings in connection thereto, be constructed of reinforced concrete, experience having shown that this is the best material for protection against earthquakes, fires, heavy storms of every description, and the ravages of tropical insects with particular reference to the destructive white ant. While the construction of these buildings, if systematically carried out, will cost at first considerably more than the present structures, General Wood holds that at the end of five years the cost will not exceed that of the temporary buildings plus the many repairs that are required for the present style of quarters and barracks. At the end of 10 years will have required practically reconstruction and will be in the last stages of usefulness, while the proposed concrete buildings would last an indefinite period. Much money would have been saved, in the opinion of General Wood, had the buildings at Fort William McKinley been constructed of reinforced concrete inasmuch as the repairs already called for as the result of the storms of one season have reached in the neighborhood of $75,000 gold.

"It is safe to say," General Wood remarks, "that within 10 years we shall have spent as much on this post as the buildings originally cost, and will have old buildings, frequently repaired, which will be entirely unsatisfactory. We should recognize climatic conditions, and adopt a type of construction designed to resist them. There is no economy in our present procedure; in fact, it is an extremely expensive one."



LAYING THE PIPELINE THROUGH A HILL AT TYTAM, WHERE TUNNELING IS NECESSARY

SITE OF PUMPING STATION ON TYTAM BAY; HEAD OF THIS BAY IS BEING DAMMED

PUBLIC IMPROVEMENTS IN KOREA

The Korean Government has arranged with the Industrial Bank of Japan for a loan of -Y-10,000,000 with which to construct important public works, which include waterworks at Chemulpo, and roads between Chinnampo and Wonsan through Pyong-yang, Tai-koo and Yang-il Bay through Kyong-gye, Chon-gye and Kunsan, and Mok-pho and Kang-gyu.

A reclamation from the sea adjacent to the present customs compound at Chemulpo will be made, upon which much-needed warehouses, etc., will be constructed. The area of this proposed first extension will be about 42,300 square meters. One or more piers will be constructed, each at least 300′ long, so as to project into the harbor from the newly reclaimed area, in such a way that cargo may be loaded and unloaded at any state of the tide. Both sides of these piers and the side of the ground facing the harbor will be used as landing places from cargo boats. This side and one pier will have a total length of 1,050′ as accommodation for mooring cargo, and they will be fitted up with cranes for the easy handling of heavy goods. The south side of the reclaimed ground, 780′ long, will be bounded by a retaining wall of lighter construction. After this work has been accomplished, the customs offices, bonded warehouses, sheds, etc., will be built.

The position of the present custom house at Fusan is inconveniently situated for further extension in any direction, because not only three of its sides are bounded by the city streets and the fourth faces the sea, but also it is hardly accessible by the railway. Consequently it is intended to reclaim ground, 20,000 square metres in area, in front of the newly reclaimed ground of the Yeizen Hill Reclamation Company as a site for the custom house, and to construct a pier from the southeastern extremity of this reclamation, thus forming a sheltered harbor between the pier and the town of Fusan. The northern side of this pier will be a stone wall serviceable as a breakwater, and on its southern side an iron quay will be constructed alongside the pier so as to afford accommodation for the mooring of vessels and to support cranes for the easy handling of cargo. The reclaimed ground facing this inner harbor is intended to be allotted as a landing place from cargo-boats; and when the work of reclamation and the construction of the pier is completed, the customs offices, bonded warehouses, sheds, inspector's department, and passengers' baggage examination office will be built, railway laid and road opened so as to give direct communication with the Seoul-Fusan Railway on the one side and the town of Fusan on the other. At present the port of Fusan has no accommodation for the mooring of vessels as well as for the loading and unloading of cargo direct from vessels. Although a company has a pier at present under construction it lacks railway connection and free transportation of goods is hardly to be expected. In discharging and landing cargo from vessels lying at anchor in the present harbor, not only is the taking of cargo into lighters and carrying of it to the present customs compound highly inconvenient, but also actual stoppage of loading and unloading frequently occurs during a northeast wind. On land too, there is scarcely sufficient accommodation for the handling of cargo. It is therefore intended to build a pier extending over 840′ from one extremity of the aforementioned reclaimed ground, of which the side facing the inner harbor so formed shall be constructed in the form of an iron quay affording ample accommodation for two vessels, drawing nearly 20′, lying alongside at the same time, to connect it with the railway to facilitate the conveyance and distribution of passengers and cargo. The present custom house at Fusan is about 10,000 square metres in extent, with a water basin in front. This water basin will be kept as it is for the berthing of coasting vessels, and in addition part of it will be allotted as the landing place for marine products and this part fitted up with certain appliances necessary to the fishing industry. The above work will be commenced early in 1906.

Along with the reconstruction of the customs the building of light houses, beacons and buoys at several important places for the aid of shipping along the Korean Coast, where the shipping business is expected to be busily engaged in the near future, is being undertaken in proportion to the advance of Korea's foreign trade. The following designs are to be completed within this year:—Wonsan Harbor light on Chotoku Island, ½ mile in the northeast direction from the Japanese Settlement in Wonsan, Wonsan buoy, Nicholski Island light, Cape Duroch light, Deer Island light, Fusan leading lights, Baker Island light, Kunsan beacon and Kunsan buoy. All of them are of new establishment, except the Fusan leading lights which are to be reconstructed. In and after next year the following are expected to be made:—Bamboo Island light, Little Green Island light, Sei Tau light, (237) Island light, Observation Island Gas Works, Yalu gas buoy, Yalu unlighted buoy, Shopaiul Island light, (133) Island light, Pic Sen Island light, Are Chu Ra Tau Island light, Choppeki Point Island light, Won Do light, Port Gate light, South Island light, Cape Clonard light, Chiku Pion Point light, Lagovitchenski, Point light, 1 Bari Tau light, West Clifford Island light, Overfalls light, Five Island light, Nine Pin Rock light, Long Island light, Cliff Island light, Stanley Island light, Sentinel Island light, Brine Point Island light, Cape Nadejda light and Bruat light.

ASSEMBLY OF DISTRICT ENGINEERS

During the current month the district engineers of the Philippine Government have been holding a convention in Manila for the purpose of exchanging views upon their work and official duties. This assembly is proving most helpful and instructive and has developed a number of most interesting papers covering engineering practice in the tropics, the best of which will appear in subsequent issues of THE REVIEW. Following is a list of the engineers who have been in attendance:—

District Engineer.	*Headquarters*	*Provinces.*
R. A. Blair	Tuguegarao	Cagayan. Isabela.
E. P. Shuman	Vigan	Ilocos Norte. Ilocos Sur.
E. S. Wheeler.	Dagupan	Union. Pangasinan.
E. C. Phipps (acting)	San Fernando.	Pampanga. Tarlac.
R. C. Hardman	Malolos	Bulacan. Nueva Ecija.
E. J. Westerhouse	Pasig	Rizal. Laguna. Cavite.
J. S. Nichol (acting)	Lucena	Batangas. Tayabas.
H. C. Humphrey	Albay	Amb. Camarines. Albay. Sorsogon.
E. O. Worrick	Tacloban	Samar. Leyte.
O. D. Filley	Iloilo	Capiz. Antique. Iloilo. Neg. Occidental
T. W. Allen	Cebu	Bohol. Cebu. Negros Ori
B. H. Burrell	Surigao	Surigao. Misamis.

Papers on maintenance, road construction, the construction, repair and maintenance of bridges and culverts, surveys and buildings, were read and discussed.

MANILA FIRE DEPARTMENT

During the fiscal year ended June 30th, 1906, the department responded to 124 alarms, which is a decrease of seven for the corresponding period of 1905. All alarms, with the exception of one or two, were received with promptness over the fire-alarm system, which was kept in perfect working order by the City Electrician's force, and the quick response and efficient work of the department reduced the losses to a minimum. A comparison of the losses for the past four years shows a steady reduction, the credit of which must be largely attributed to the increased efficiency and better equipment of the department. The following table is self-explanatory:—

Losses for—

1903	₱1,670.650
1904	468,911
1905	135,921
1906	76,192.90

The losses for 1906 are divided as follows:—

Buildings	₱50,175.50
Contents	26,017.40

The total insurance on property affected by fire during the fiscal year 1906, according to the records of the Fire Department, amounted to -P-692,237 on buildings and ₱853,620 on contents.

The total value of all buildings in the city subject to taxation according to the records of the city assessor and collector is ₱35,101,983. The approximate value of all buildings erected during the last fiscal year, plus repairs on old buildings, is ₱2,600,000, which therefore represents the approximate increase in the value of improvements subject to taxation, disregarding the element of one year of deterioration of all old buildings. The total loss due to fire on buildings during the same period was ₱50,175.50, or approximately one-seventh of 1 per cent. According to the annual report of the fiscal year 1905, the damage from fire was slightly less than one-fifth of 1 per cent.

Act No. 1421 appropriated for the fiscal year for—

Salaries and wages	₱237,000.00
Contingent expenses	60,450.00
Total	297,450.00

The expenditures were as follows:

Salaries and wages	₱238,739.74
Contingent expenses	56,069 89
Total	294,809.63

The above statement shows a decrease in expenditures of ₱22,757.54 over the previous year. This favorable reduction in the cost of operation and maintenance of the department has been accomplished without any loss in efficiency and is largely due to the elimination of nonrecurring expenses chiefly in the purchase of equipment and in the extension of the fire and police alarm systems.

It has been noted with much satisfaction that the firemen, especially the Filipinos, are taking more pride in their personal appearance, says chief Dingman in his annual report. There has been an increase in the number of requests received from probational members to wear the uniform, which is a privilege only credited to those who can obtain the recommendation of their commanding officers. A better class of men of both grades is seeking employment, and there has been no difficulty in securing good men to fill vacancies. The Filipino firemen in particular render uninterrupted service and they value their position very highly. The constant training under experienced American officers is entirely satisfactory and many 2d-class firemen are exceedingly efficient, and when operating under the direction of officers they perform their duties in a way which promises well for the future. The 2d class men have learned to use their heads and to study the methods of attacking a fire, and those who have had two or three years' experience are less liable to confusion or to expose themselves to unnecessary danger, or to lose time in useless activity. All the men who resigned had better positions in view, and several of the 1st-class men have returned to the United States for the purpose of going into business. Wherever possible these vacancies have been filled by promotions from the 2d-class.

PHILIPPINE ISLANDS PROMOTION MOVEMENT

When Mr. George Bronson Rea, publisher of THE FAR EASTERN REVIEW, was in Washington last winter in the interest of favorable tariff legislation for the Philippine Islands, he was forcibly impressed, among other things, with the almost general ignorance and lack of interest displayed by the people regarding this country. Like other Manilans who were working with Congress to induce it to give the Islands that relief their people, trade and industry deserve, and are entitled to, he saw that among the many important steps necessary to accomplish something for the Philippines was systematic and persistent missionary work in financial and commercial circles, and among the masses of the people. Immediately after concluding his work in Washington he set about to evolve a plan of promotion by way of a publicity campaign in the United States, to the end that the Philippines would be presented in a favorable light before the American people, the merchants educated up to a better idea of the possibilities of the Islands, and the manufacturers and capitalists informed of the opportunities for trade and the development of the latent resources of these possessions. Mr. Rea is now en route to New York City, where he will, about the first of the new year, start his promotion campaign. He will open an office there for THE FAR EASTERN REVIEW and also establish in the heart of the financial district of New York a general information bureau for the Philippine Islands. This bureau will be fitted out with a complete library of all official publications pertaining to the Philippine Islands, of local newspapers, of extra copies of department pamphlets describing the hemp, maguey, sugar, mining and other industries offering large fields for investors; copies of the principal laws of the Islands regarding commerce and industry such as the corporation law, the land law and those relating to mining, forestry, shipping, etc., indispensable to the preliminary investigations of capitalists; of department maps, surveys and plans, and specimens of leading Philippine woods, minerals, agricultural products, etc. A press service and press-clipping service will also be one of the important features of the missionary work. In fact, it is Mr. Rea's intention to keep before the American people through every possible channel of publicity the true facts about the Philippines and their future trade and industrial possibilities. Before definitely deciding to take up this work, Mr. Rea presented his plan in detail to the Governor-General and the members of the Philippine Commission for their consideration. After looking into the matter quite thoroughly the heads of the central Government decided to give Mr. Rea their unqualified support in the way of supplying him with official material, etc., to enable him to organize his promotion bureau, and affairs have been so arranged at this end that immediately upon his arrival in New York Mr. Rea will be prepared to begin his propaganda. He will not only work in harmony with the Government but also with the chambers of commerce of Manila, and it is believed that with his past experience along these lines and his large and accurate knowledge of Philippine needs and resources he will be able to accomplish much for the future of the Islands. Mr. Rea's services will be given to the cause of the Philippines without expectation of monetary remuneration. All that he asks and expects is the earnest coöperation here of those interested in the work he will seek to accomplish in the homeland.

GEORGE BRONSON REA, M. E.,

WHO WILL PROMOTE PHILIPPINE INTERESTS IN AMERICA, WITH HEADQUARTERS AT NEW YORK CITY.

ORIENTAL TRADE DECLINE

New York and London daily newspapers have recently been discussing the alleged decline of American trade in the Far East, pointing out that exports to China, Japan and Hongkong fell from $78,321,979 gold during the first seven months of 1905 to $42,484,388 in the first seven months in 1906. Also that shipments to China dropped from $37,181,220 to $20,612,191, and shipments to Japan from $36,800,468 to $18,774,726.

The fact is entirely overlooked that abnormal trade conditions existed in the Far East in 1905. The cessation of the Russia-Japan War caused an influx of imported merchandise from both Europe and America too great for the consumption of the people. This excess overstocked the markets for 1905, and the natural result was the checking of imports, China and Japan buying less this year from other countries. The total amount of Japanese imports for the first six months of 1906 was $108,534,191 gold, a decline of $30,873,319 from the first six months of 1905.

That Japan's reduced purchases did not affect America alone is evident from British official figures. These do not yet show total exports to various countries, but exports are shown by commodities. In iron and steel manufactures Great Britain made new high-record strides in exports this year, yet her sale of these goods to Japan in the following lines (all that are detailed) fell off, the figures being for the first seven months of the respective months:—

	1905	1906
Pig iron	$565,750	$364,885
Iron forgings	247,977	98,403
Wrought iron	64,072	31,849
Iron plates	113,409	107,442
Galvanized sheets	1,044,775	784,435
Bars and angles	690,644	639,817

In these items alone Great Britain's sales to Japan decreased by about $700,000 gold for the first seven months of this year over those of the 1905 period.

The heavy end of China's purchases is in cotton goods, and Great Britain simply shared America's lot in reduced trade therein. The shipments of all classes of British piece goods to China and Hongkong from January 1st to August 1st, 1906, totaled $24,796,863 gold, a decrease of $2,905,962 from the same period in 1905. The American loss was somewhat greater, being $5,533,083 gold, the sales amounting this year up to August 1st to $13,673,223.

With a boycott to contend with the showing is not so bad, especially considering that for the first seven months of 1904 the cotton cloth sales of the United States to the Chinese Empire and Hongkong amounted to only $3,667,968 gold, when those of Great Britain totaled $18,286,020. Thus the cotton goods sales of the two countries in China stood about 1 to 6 in favor of Great Britain in the 1904 period and 1 to less than 2 in the 1906 period.

ELECTRIC RAILWAY EXTENSION, MANILA

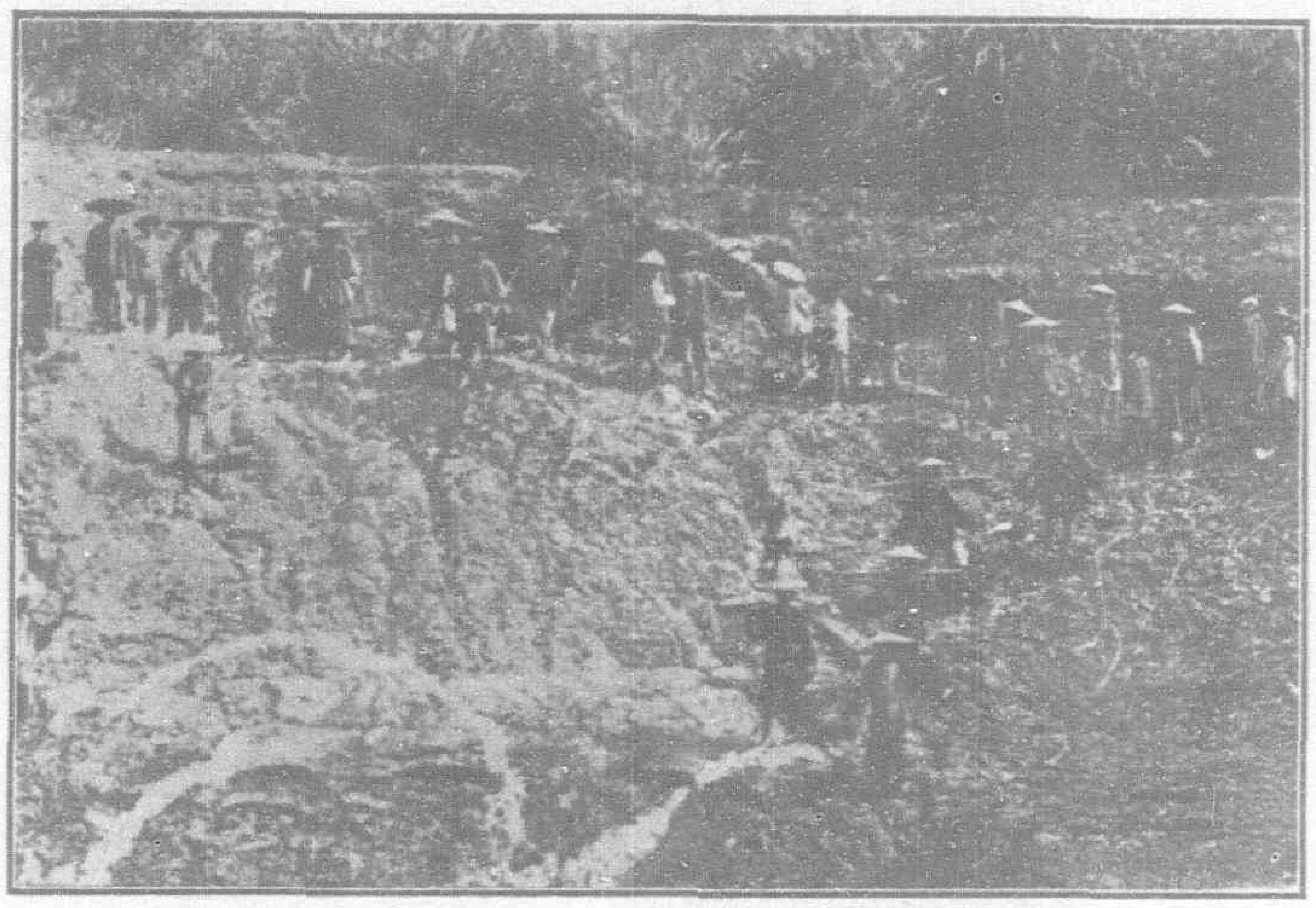
Messrs. J. G. White & Co., Inc., are rushing the construction of the extension of the system of the Manila Electric Railroad and Light Company to Fort McKinley, Province of Rizal, to completion. Six large construction cars were received recently to facilitate the work. They are extra-heavy, double-truck cars with larger wheels than ordinary, and are about 37′ in length. When construction work is finished these cars will be turned over to the railway company who will convert them into freight carriers for use between Manila and the military reservation. On account of the rainy weather the work of grading the new extension has been slow, but the contractors now have a large force of laborers employed and track-laying has begun. It is believed that the new line will be turned over to the railway company shortly after the first of the new year.

COMPREHENSIVE REVIEW OF THE MALAYSIA TIN-MINING INDUSTRY

(*Written specially for the "Straits Times" by Mr. Ralph Stokes.*)

The unprecedented rise and fluctuations in the price of tin have drawn unusual attention to the question of the future supply of this ill-distributed metal; and, although keen public interest has been awakened in the matter, largely with the hope of drawing new lifeblood into the financial veins of certain languishing fields, it has always been allowed that Malaya must long hold the key of the position. In view of this country's 62½ per cent contribution to the world's aggregate, such a recognition of its influence involves no extraordinary perception nor generosity of mind. But the greater part of the commentaries on the tin position published in the home non-technical press has comprised but truisms and platitudes, followed by very questionable or extravagant generalizations as to effect of the rise on various mining fields of lesser import. The influence of the advance in valuation of the metal has not been strikingly manifest in Malaya. For indeed, as it is scarcely necessary to reiterate, the standardization of the dollar has led to an augmentation of operating costs all round, not excluding those companies largely dependent on imported machinery and coal. It is of interest to regard the matter in this light, justifiably assuming that it costs as many dollars to do a given piece of work, whether the exchange is 1*s* 9*d* or 2*s* 4*d*. During 1902-4, the average price of tin was $80 a picul; to-day it stands in the vicinity of $88—a rise of only 10 per cent. Yet, on the sterling basis, the rise is nearer 40 per cent for the period.

FAMILIES OF ANNAMESE TIN-MINERS IN MALAYA

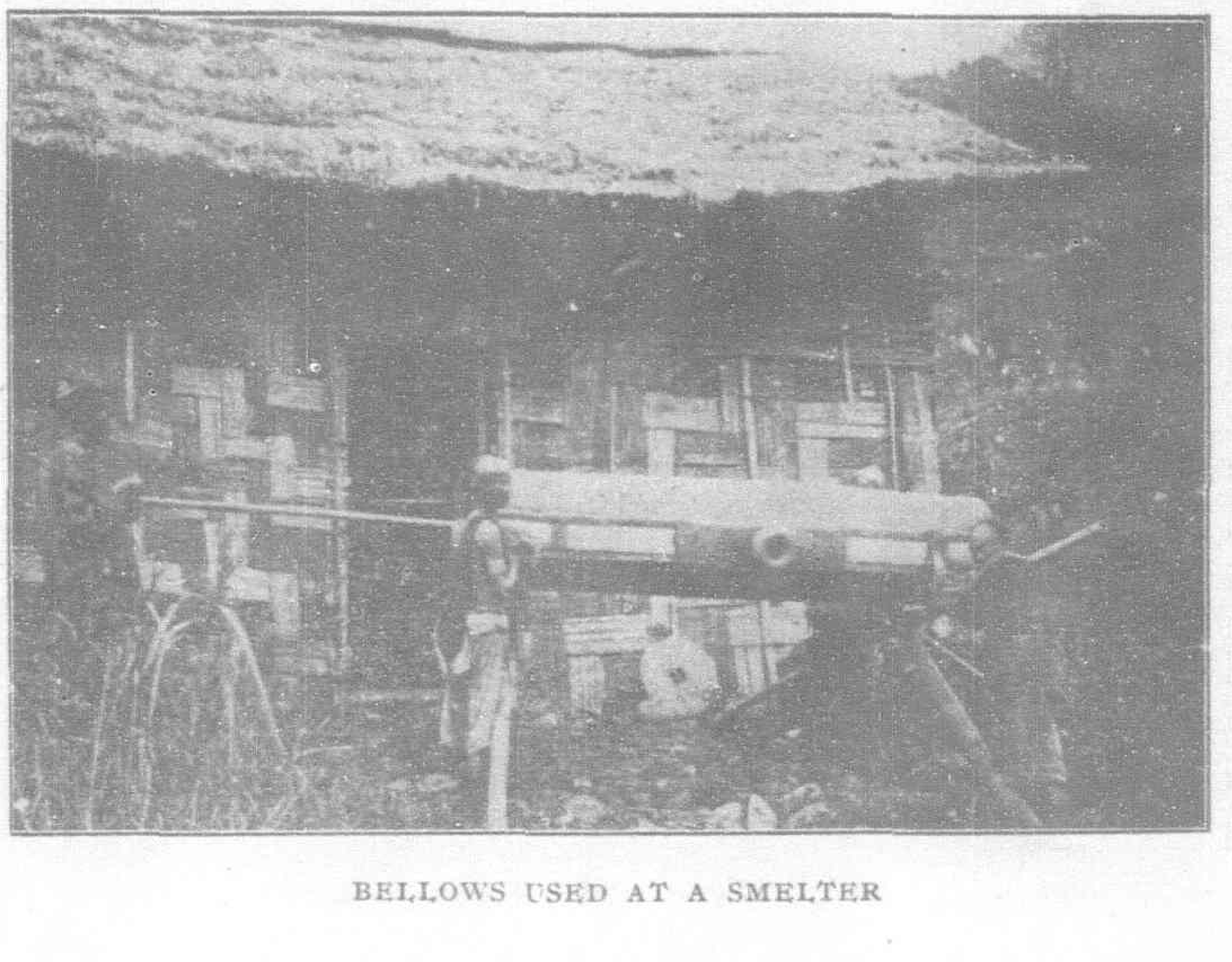


SURFACE MINING IS PROFITABLE AND PRODUCTIVE

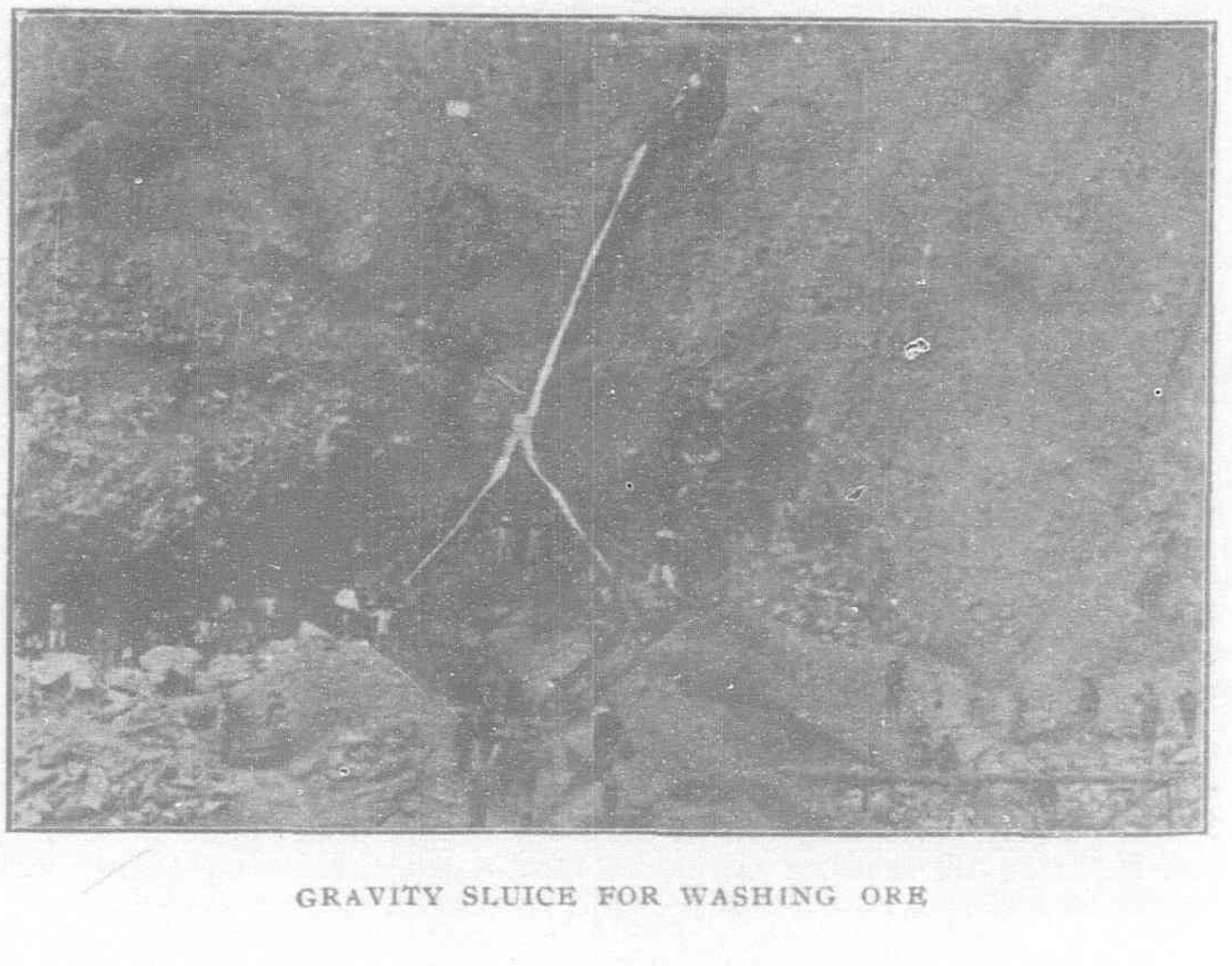
EXCELLENT SUGGESTION.—Other dominant factors in the present position are the slow exhaustion of the richer surface deposits, worked by the Chinese, and the steady increase in the percentage of tin produced by the European-controlled venture. It is to be regretted, having regard to the manifest ignorance prevailing in the outside world of Malay conditions and to the similarly manifest need for the introduction of more capital, that the Mines Department in conjunction with Mr. J. B. Scrivenor, Government Geologist, does not issue more readable annual reports, upon the course of events and the work of the principal mines. A systematically compiled review of this description, running to 50 or 100 pages and illustrated (I only suggest what is done as a matter of course in other colonies), would without doubt be highly advantageous to the interests of the States. Apparently, however, the department has its time too fully absorbed with legal questions and disputes as to water-rights, mining leases and the disposal of ubiquitous tailings.

In some respects, however, it may be said that the neglect of the Malay tin-field by financial men has been a blessing, for now that the time has surely come for the mining engineer with capital behind him to extend his control, the financial atmosphere is comparatively pure. Compared with other mining fields of like magnitude, Malaya may certainly be said to have a good financial record. Honest failures can be nowhere entirely avoided. But in nearly all cases, it is to be seen that the basis of capitalization adopted has been reasonable. The fact that the capitals of 13 leading producers in Perak, Selangor, and Negri Sembilan total £840,000, demonstrates this absence of excessive capitalization. Occasionally, the fault of providing insufficient working capital is committed. Perhaps, the Kledang company floated in Cornwall two months ago, with a capital of £100,000, has fallen into this error. For the initial expenditure must be heavy, and only £20,000 working capital, with 5,000 reserve £1 shares, has been allowed.

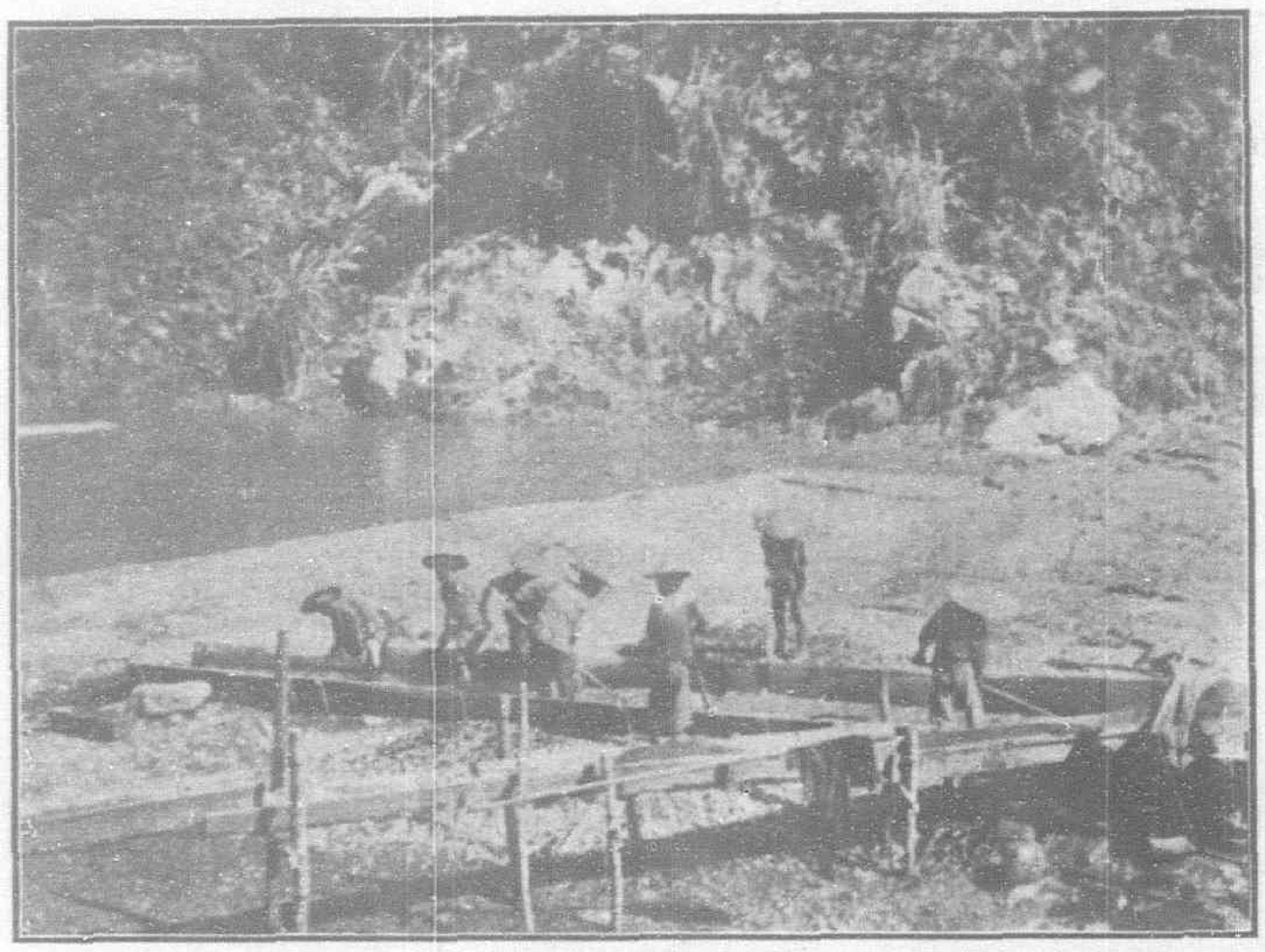
DUTY QUESTION.—The Government is occasionally censured for failing to encourage the capitalist, or, rather, for actually discouraging him by keeping the present undiscriminating schedule of taxation in force. Concessions should be allowed, it is claimed, to the company spending large sums on plant and development; the duty payable by such concerns should be less than that for the surface working, equipped, may be, with only an endless chain pump, and a land shoot or two. The Government position is clearly a difficult one. To suggest that it would wittingly act contrary to the general interests of the mining industry and country is absurd. It must, moreover, be borne in mind that adequate allowance is already made to those ventures requiring to blast and crush their tin-bearing ground. The *lode* definition was recently cancelled for one simply of hardness, to be determined by the Senior Warden of Mines and the Government Geologist. Thus a body of calcite-cemented ore, as at the French company's Lahat mine, receives the maximum 50 per cent concession, whilst a true lode deposit, greatly decomposed, may receive much less. This is just enough, but does not apparently satisfy the demands of those who wish to see allowances made in respect of capital expenditure on plant. Were such made, it is to be feared that the towkay mine-owners would consider their conservatism inequitably penalized and would protest vehemently, claiming that they are



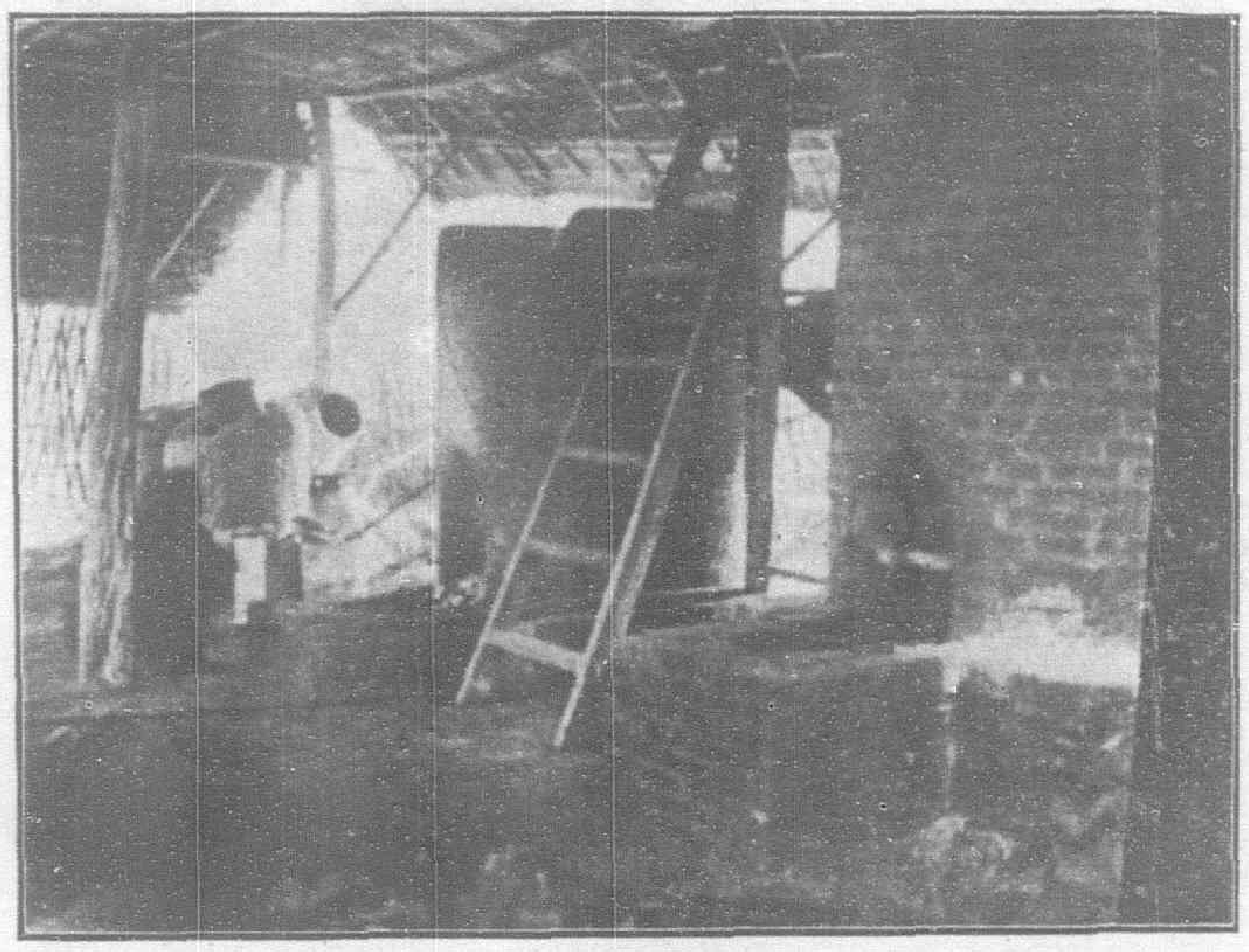
BELLOWS USED AT A SMELTER



GRAVITY SLUICE FOR WASHING ORE



WASHING ORE AT FOOT OF A GRAVITY SLUICE



BRICK KILN FOR SMELTING ORE

paying out twice or three times as much in wages per picul produced as their favored neighbor with steam navy and blondin conveyor. The whole question of taxation is one calling for the most delicate handling, especially in fields where no system of profit assessment is practicable and wherever the duty is high, as in Malaya, the Government policy must necessarily meet with disapprobation. Whether the finances of the States are not sufficiently sound to permit of a general reduction is another matter, worthy of independent discussion. If the present high rate is only prompted by fears of a speedy exhaustion of the tin, then certainly such a happy decrease would be advantageous and politic. But the official mind is of inscrutable, though rarely as irrational as the uninformed critic would proclaim.

In one way, at least, it must be acknowledged that the Government has lately been working justly in the capitalist's favor, at the expense of the Chinese leaseholder. In Perak particularly—where the policy is of greatest importance—the Resident has been strictly enforcing the labor clause of agreements. Mr. Birch has declared himself anxious to see the ground either worked or abandoned. Thus, many leaseholders—who might have held out indefinitely for some exorbitant price—have been recently endeavoring to dispose of their ground, perhaps low grade or deep level to those with the capital and knowledge to turn it to account.

Ultra Prosperous Coolie.—There have been whisperings recently, now that survey plans and records have been brought into reasonable order, of the Lands Department throwing open the long-closed application books for Perak. It is very doubtful if any good purpose could be served by the alienation of further tracts of mining ground. Chinese immigration is now more or less at a standstill and as elsewhere in the peninsula, labor is signally independent. With the gradual exhaustion of the surface deposits and the installation of labor-saving devices, there is some hope of the position righting itself, from the employer's point of view. But the opening of new ground would only tend to provide further demands for the services of the ultra-prosperous coolie, new temptations to the deserter. Moreover, is it not to the very distinct advantage of the country that the old ground be thoroughly exhausted before its abandonment for "pastures new"?

Natural Features.—It is only necessary here to give, for the sake of completeness, the roughest outline of geological conditions. There are yet many problems associated with Malay geology calling for solution, but they are secondary rather than primary perplexities. The broad features of the tin-fields are well-known—the great axial range of granite mountains, running north and south, with schists and gueisses along its marginal contact, and the upturned limestones, standing as precipitous jungle-covered hills to heights of 1,000′ and 2,000′. In the plains along the western edges of the granite, the best alluvial tin occurs. In many places, so many, in fact, as to suggest a principal source of origin, the tin has been traced to the lowlying hills of schist and pegmatite ranging along the margin of the granite. Meru, Bruseh, Jeher, Sipiau and Sudu Seremban may be cited in this context. Yet unmistakable tin-lodes, as the Government Geologist has proved beyond question, are also found in the limestone.

It is unfortunate that the Government Service does not include a larger Geological Survey, for there is yet much information to be collected concerning the nature of Malay tin deposits, of great industrial import. The task is clearly beyond the capabilities of any one man however skilful and energetic he may be. Nevertheless, Mr. Scrivenor has succeeded in performing a great deal of good work since his first engagement by the Government and a comprehensive report, to be prepared by him at the close of this year, will be a particularly valuable record of three years' labors. That Mr. Scrivenor's attention should have been principally concentrated upon lesser known Pahang was to be expected, but the more remarkable features of the western States have not been neglected and the anticipated review should be satisfactorily far-reaching in its sphere. Yet the fact should not be lost sight of that the ultimate aim of every Geological Survey must be a geological map,—a compilation of inestimable value to any country.

It may be approximately estimated that from 85 to 90 per cent of Malay tin is contributed by the Chinese. Despite their preponderating importance, the Chinese workings and methods will not be discussed in this article, purporting to deal exclusively with the present situation. And Chinese mining has been the same for decades past. There are two famous Chinese mines, Tambun and Kamunting, typifying the advanced and conservatively backward classes, whose position may be pertinently noted.

Tambun.—The Tambun, once the world's greatest tin-producer, whose 1903 yield of 2,417 tons of metal was equivalent to half the production of all Australasia or Cornwall, is owned by Mr. Liong Fe, M. C. It may be recalled that an Englishman of high standing in the mining world was once part owner of the ground (which was being held for coffee planting) and sold his share for the proverbial song, all unsuspecting the enormous wealth of the property. The Karong or tin-bearing deposit occurs at a depth averaging 40-50′ and has been in the past entirely worked on the Chinese shafting system, on particularly daring principles. An examination of the surface to-day and of the great subsidence over the old workings, marks how the gradual fall of the ground was profited by underground of the miners, who allowed their props to sink into the footwall whilst they kept pace with the subsidence. The value of the ground extracted cannot be exactly determined. During 1902-3, it averaged 26 katis per yard. Although the best days of the mine are surely past, there is still a considerable life ahead of the deposit. Shafting has now been stopped and the proposition is being transformed into a large opencaste. While this is proceeding, outputs will be nominal. There will be a large quantity of low grade ground made available for profitable treatment under the altered conditions and for this a new horizontal puddler and 300′ of sluicing are being installed. For a Chinese mine, Tambun has always been remarkably well equipped, Mr. Liong Fe having discreetly placed his property in the hands of competent engineers. The plant comprises four 20′ puddlers, from which the concentrates are run to a belt elevator, raising them above the trommels and jigs. Any rock fragments too large for the first trommel are passed to a jaw rockbreaker, Huntingdon Mill and Wilfley table. Altogether, an undoubtedly good extraction is obtained.

Kamunting.—Kamunting, the largest opencaste mine in the country and strangely situated in the languishing district of Taiping, presents a peculiar contrast to Tambun. It is held privately by Mr. Ng Boo Bee, whose ideas are conservative in the extreme. The output maintained is 1,500 piculs per month (black tin) and for this 4,000 coolies are employed,—an inadequate supply, according to the views of the merchant proprietor. People, who criticize the Chinese mine-proprietors for their lack of perception and their backwardness, are inclined to forget that machinery is apt to be trade-destroying as well as labor-saving. At Kamunting, Mr. Boo Bee courteously told the writer that monthly expenses total $40,000, of which $32,000 represent labor.

The open-caste at Kamunting is some 2,400′ long and about 100-150′ across. The depth of the karong averages 30-40′. This pit is being carried steadily across the property, the discarded overburden and wash dirt tailings being dumped at the exhausted side. The tin is extracted in the common landshoots (without preliminary puddling), of which there are 17 double sets. Only a fair extraction is obtained. The majority of coolies are on day's pay, but the removal of ground is also undertaken on contract, at the rate of $9.50 per 50 yards for Karong and $7.50 for overburden. The Kamunting appears to have a large stretch of virgin ground yet available.

Turning from this essentially Chinese mine to the European influence, it is gratifying to record a substantial advance. In Perak, and especially in the richest section of it, Kinta, the European control is of particular strength. It may be calculated that nearly 1/5 of the Perak tin yield is derived from properties owned and managed by white men. Yet the number of mines falling under this category is small. Below is given a brief summary of the position and prospects of the principal producers of to-day, together with two or three properties approaching the producing stage, such as Redhills and Rambutan.

TRONOH TIN MINES.—This leading producer, at the present day, was floated in 1902 with a capital of £160,000 which has now been almost returned to original shareholders. There are still some doubts as to the character of this wonderful deposit, which are being removed by a series of boreholes, but the general form of the ground is well-known. The run of the deposit is approximately north and south and along the west ranges a hill of shale, slate, altered sandstone, and detritus. On the other side is a bed of limestone, whose *sub-outcrop* is cut at 40′ in the main vertical shaft. The width of the deposit is about 500′, its length over 2,000′, and the depth uncertain. A drill struck limestone in one spot at 147′ and, at another, failed to bottom at 190′—the two bores having been 1,800′ apart. The value of the karong, a sandy clay, may be estimated at 1½ per cent. Owing to an inconsistency of policy and uneconomical distribution of plant, working costs at the Tronoh are deplorably high and some sort of reform must surely be soon effected to bring them down to a reasonable figure. It is proposed to work the deposit by means of the main vertical and one other, outside the mine area to the west. Possibly open-casting is the solution of the difficulty, though this would probably necessitate an enormous amount of non-productive work. Open working was largely undertaken by the former owner, Mr. Foo Choo Choon, but this cannot be continued, under present conditions, without causing slips from the hill. The eivdence of the boreholes, however, must assist considerably in the formulation of the new working scheme.

There are two sets of treatment plant, each including four puddlers and four or five landshoots. Some 20,000 trucks are treated per month for a yield averaging upwards of 3,000 piculs of black tin. The overburden is in many parts 50-60′ thick.

Tests have lately been undertaken at the mine to determine the important question as to the relative economy of wood fuel and imported Bengal coal. As at Tambun, the latter is to be regarded with greater favor, and it seems probable that the use of coal will soon become far more general than it is at present.

FRENCH MINING COMPANY.—The *Société des Etains de Kinta*, popularly known as the French Mining Company, was formed in Paris as far back as 1880 and must be placed among the greatest pioneers of scientific tin-mining in Malaya, although its methods have involved no exceptional engineering acumen. It is surprising that the prosperity of this venture, whose profits have totalled over 8,500,000 francs and whose continued success is evinced by last year's record profit of about 1,300,000 francs, has not led to the introduction of more French capital into Perak, for no mining investors are gifted with greater pluck and discernment than the Parisian.

The French company holds several properties, but of paramount importance are those situated at Kampar and Lahat. The former comprises a large stretch of alluvial, on which there are three workings, two open-caste and the third shafted. The average grade of the ground, taking the full face of 50′, is estimated to run a picul to the 50 yards, but as a large percentage of barren overburden is removed, the grade of the ground passing through the puddlers may be raised, to perhaps 20 katis per yard. From the three workings, 2,100 piculs per month are won. It is now proposed, however, to establish a central power station, operated electrically from a waterfall near the property, which would enable the manager (Mons. Legros) to attack some lower layers of karong, proved to exist between 110-150′ deep, requiring more powerful pumping plant. The fall for the turbine will have a head of 1,300′ and register 60 galls. per second. According to the new scheme, about 2,000 tons of ground per day should be puddled and sluiced.

LAHAT.—Of greater interest, mechanically and geologically, is the French company's Lahat property. The origin of this ore-body in the limestone is yet uncertain, having baffled the Government geologist and all other observers. The mass consists of a pipe or chimney of calcite-cemented crystals, netiher waterworn nor symmetrical, about 25′ in diameter and dipping almost vertical. At some depth, it makes into ramifications, but at 160′ the body is still strong and rich. Round the edge, iron pyrites is to be noted, but no quartz or tourmaline, suggestive of lode origin, has been detected. In fact, this is most surely not the result of stanniferous solutions or impregnations, but has been mechanically formed in some inexplicable manner. The richness of the body, which runs up to 40 per cent tin oxide (74 per cent metal) militates against the simple hypothesis of a cemented pocket of alluvial. How has the concentration occurred? The Government Geologist is praying for a recurrence of the phenomenon, which may throw further light on the question. But the majority of other tin deposits in the limestone have proved true lodes, associated with iron, copper, and arsenical pyrites.

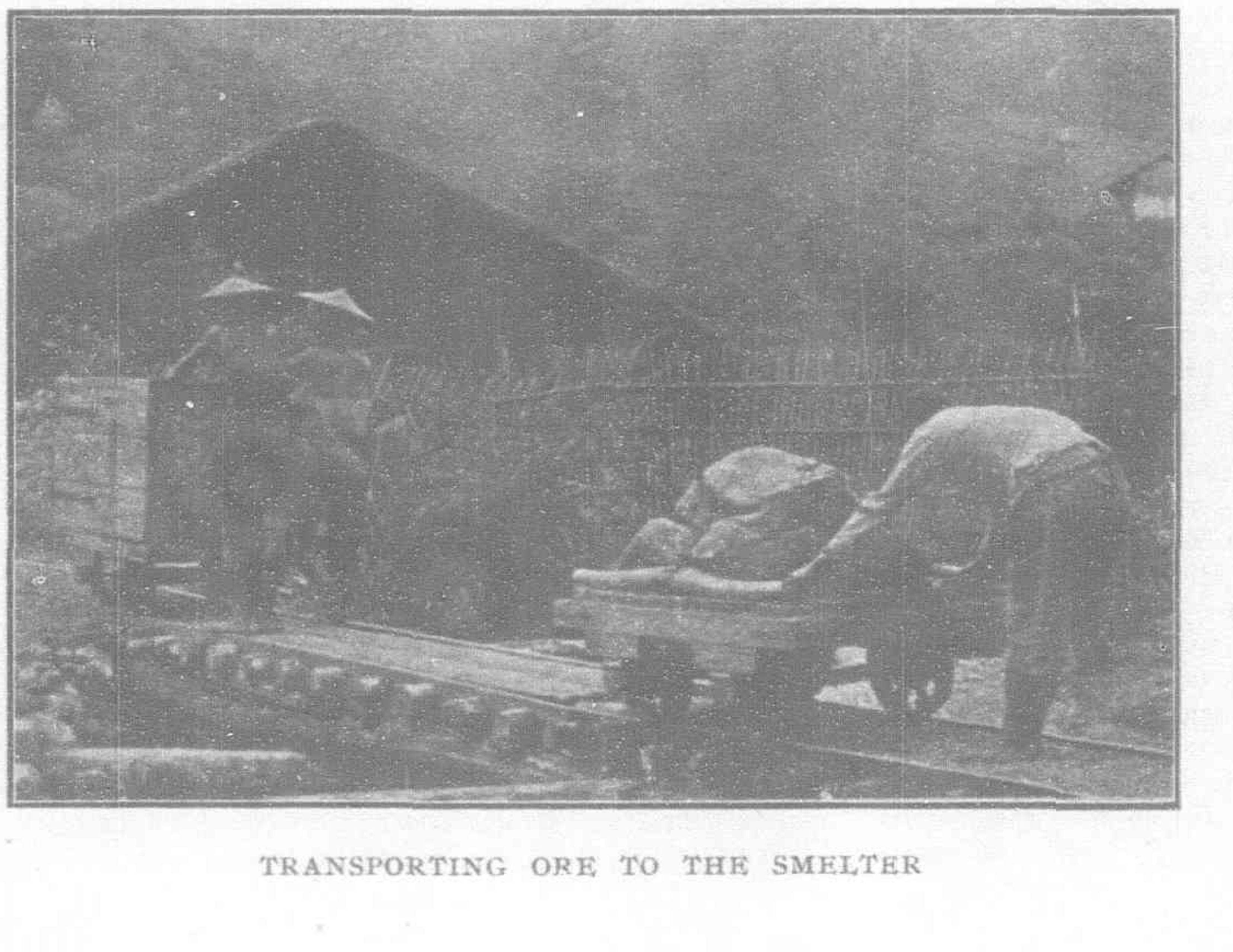
The Lahat mine is also noteworthy for its efficient electrical equipment and gas producer plant. There are two Letombe gas engines of 35 h. p. each and, with the use of charcoal fuel, the manager is able to keep his power costs at a figure (3 cents per h. p. per hour) about ⅓ of the local average. Some 700 to 750 piculs per month are produced at this Lahat mine.

PUSING LAMA COMPANY.—The Pusing Lama Tin Mining Company, floated in London with a capital of £98,000 has recently improved in outlook very considerably, owing to the success of systematic testing operations conducted over the property. It is a proposition of several parts. The mainstay of the company appears to consist of the large gravelly low grade body, including stanniferous lumps of quartz, conglomerate and other rock fragments, extending from Redhills. Fifteen stamps, in conjunction with six puddlers, are employed in crushing the stones, but this mill is inadequate for the quantity derived from upwards of 1,000 trucks of ground per day and considerable pebble accumulations are being reserved for subsequent treatment. The ordinary clay and gravel averages 3 katis to the yard, whilst the hard lumps are estimated at ¾ to 1 per cent. But mill returns, equivalent to half the aggregate yield, have lately been augmented by the contributions from a new section of the property. In the course of his prospecting operations, Mr. Currie struck a rich body overlying a boss of modified granite, which certainly appears to be a highly decomposed contact lode. Of the value of the strike, it would yet be premature to speak with any suggestion of confidence, for its persistence is improved. Rich stuff has been obtained in three trial shafts, whilst the deposit has been missed in others. An adit, being put in to cut the contact at a depth of 50′, should afford satisfactory evidence as to the significance of this new asset, which is at least of good promise.

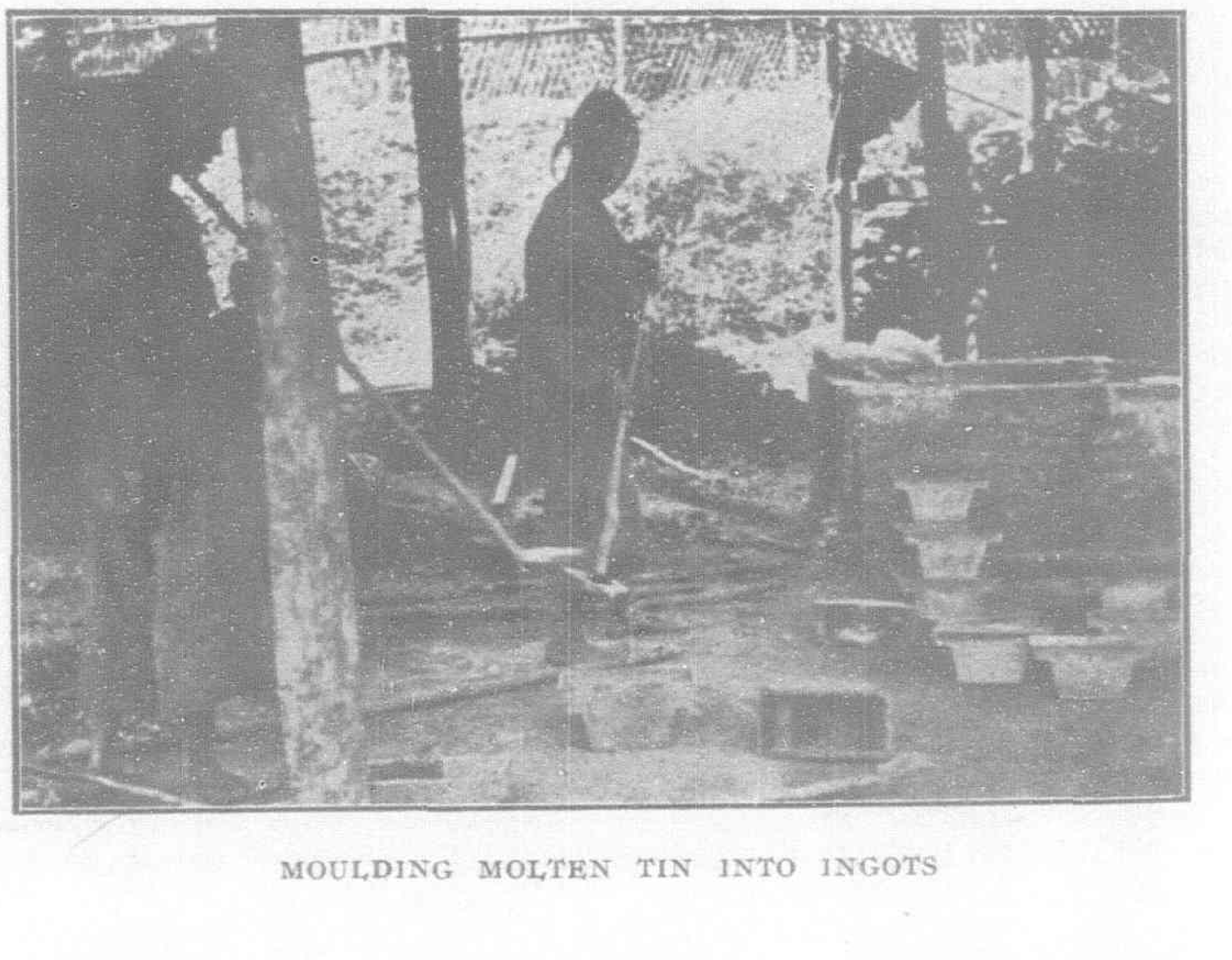
As for the alluvial section, the lie of the country is unfortunately unsuitable to make hydraulicing economically possible, though a limited section capping the hill is to be run through sluice boxes by this method. The policy of the Pusing Lama appears to be one of caution, and the necessary additions to plant are being made gradually, without the expenditure of large amounts. Recent installations include a Wilfley table, a revolving concentrating table, and magnetic separator for the specular iron associated with the cassiterite. The management of the property is in particularly able hands—a fact tending to minimize the natural speculativeness of the proposition. A yield of about 1,200 piculs of block tin per month is regularly declared.

BRUSEH: A UNIQUE PROPOSITION.—Among the several prosperous hydraulicing ventures in Malay, the Bruseh near Bidor calls for prominent notice. For this property is not only the lowest-grade of any class operated in the peninsula, but is probably the cheapest-worked and lowest-grade lode proposition in the world. When some of its costs are given, no attempt, of course, should be made to compare them with the expenditures of the average lode mine, where conditions are likely to be radically different. But Bruseh figures, besides being highly creditable to the management, are of principal interest in the mining world to emphasize the necessity for closely scrutinizing relative conditions when endeavoring to establish instructive comparisons between the costs of two mines. In a Transvaal gold-mine, gold recovery costs 23s. per ton crushed; at Bruseh, with a lode proposition, requiring to be blasted, tin is won at 12 cents per yard. These parallel statements, in one sense absurd in their juxtaposition, pertinently illustrates the limitations of such comparisons.

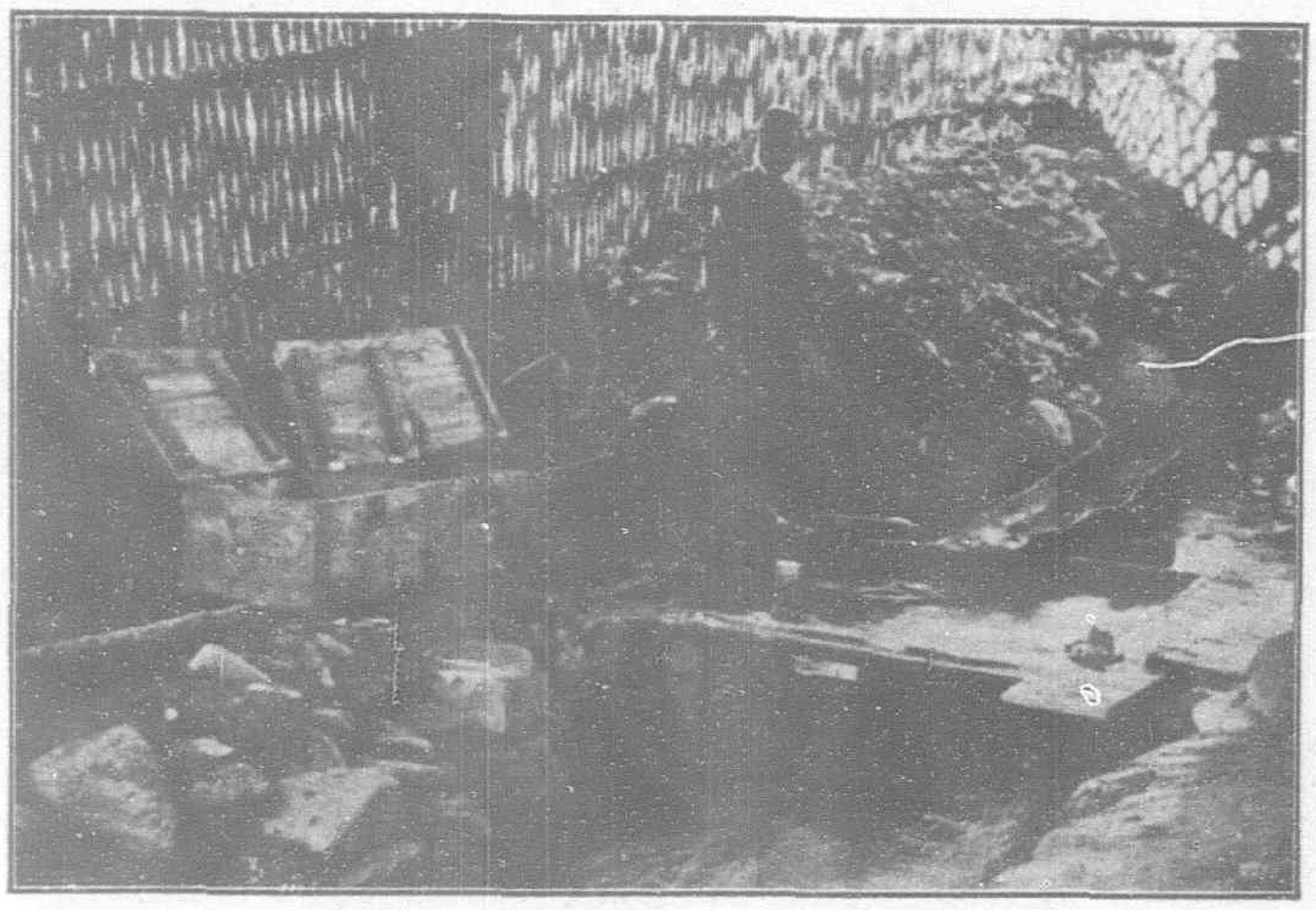
The Bruseh company holds about 1,100 acres of hill land at the foot of the main granite range. Prior to the arrival in 1904 of Mr. O'Brien, the able Californian manager, work was principally done on the decomposed surface soil on the hillsides. The formation consists of silicious schists (in contact with the granite) whose bedding planes head away from the contact, dipping 50 degrees south-east. The tin ore is found in a series of small impregnation veins, about ½″ thick, in a foulted zone near the contact. These



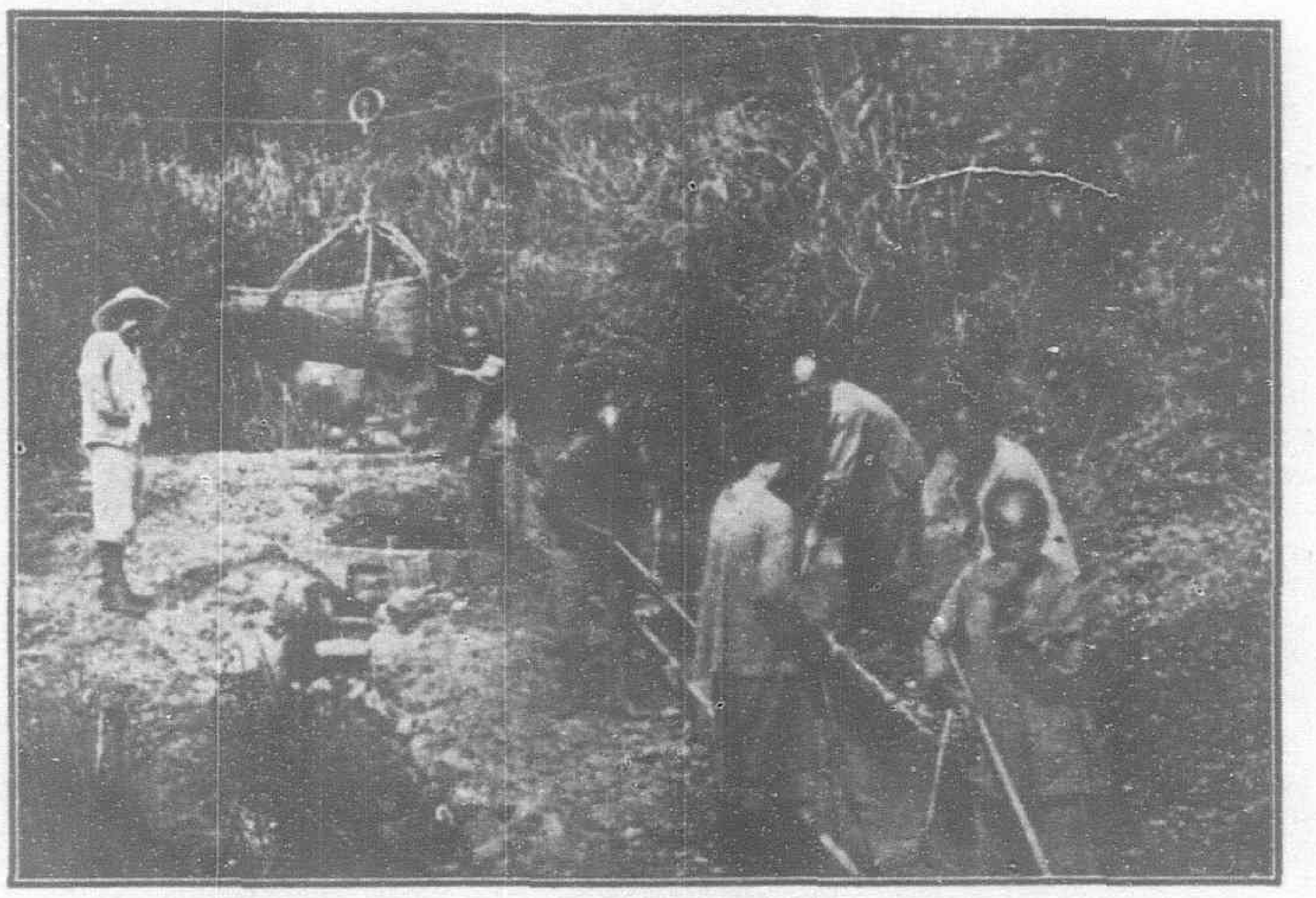
TRANSPORTING ORE TO THE SMELTER



MOULDING MOLTEN TIN INTO INGOTS



SLUICE FOR PANNING OUT FINE ORE



BASKET-TROLLEY FOR CONVEYING "SLUICED" ORE

veins strike slightly north of west and south of east, and dip 38 degrees approximately north. At present work is proceeding on a large hill, 240′ high, giving a cutting bank 220′ high in three separate mines. The ground is first "T" drifted, and broken with heavy charges of powder. Water through a 3″ nozzle, at 130 lbs. pressure, is turned on to the fallen schists, which are beaten back against the bank with giants until thoroughly disintegrated. The ground is then allowed to pass through the sluice boxes, which are 4′ wide, 20″ deep, graded at 1 in 24, riffled with inverted rails 1½″ apart and are 300-400′ in length. The greater part of the tin is won in the first three boxes or 36′ length of sluice. A clean-up is made every third or fourth day and takes about 3½ hours. The water used in each box averages 750 cub. ft. per minute. The ore as taken from the riffles contains 10 to 22 per cent of dirt. Seven miles of pipe line serve the monitors.

The figures for one mine (owned and worked by the Bruseh company) for a recent six months, are instructive. In 181 days, 209,000 cub. yds. were removed (1,155 per day), of an average value of 391 kati per yard—say 23 cents—at a cost of 12 cents per yard. No other hydraulicing company in the Federated Malay States can produce figures to compare with these.

JEHER HYDRAULIC.—The Jeher Hydraulic Tin Mining Company, working on a smaller scale than the Bruseh, though on the same line of formation, was floated some 18 months ago. Its ground is considerably richer than that above described. The tin occurs in narrow and rich quartz veins in decomposed schist, which needs blasting. A couple of monitors are engaged in clearing away the overburden worth about one kati per yard, is all put through the sluice-boxes. The strike of the formation is east and west, and the dip south. An average yield of 500 piculs of black tin is maintained. There are several large low-grade bodies on the property, whose profitable treatment may be found possible. It cannot yet be said how long the boss of tin-lode-containing schists will prove amenable to present cheap methods of treatment, before the quality of solidity is assumed below the decomposed zone. The water-race in use is 5 miles long. 7½′ wide, and 3′ deep, with a fall of 16′ per mile. The main pipe line is 2 miles long 22″ in diameter and has a vertical head 604′. Chinese miners had accomplished considerable work on the deposit, before the management was taken up by Mr. Proust, but a suitable scheme of exploitation had not been adopted.

OLD HYDRAULICERS: GOPENG GROUP.—In the Gopeng District, there are three large hydraulicing propositions under the control of Messrs. Osborne & Chappel, the engineering and mining pioneers of the Malay States, who were among the first to realize the possibilities of working low grade bodies on a large scale and have profited fittingly by their perception. The Gopeng company itself, which worked with two monitors in 1892, has been producing and paying dividends ever since. It was the second hydraulicing venture to start in the country, a failure near Charnkat Pari having been the first. As many as ten monitors have been simultaneously employed. Today, a yield of about 36 tons of black tin per month is registered and last year's dividends of 25 per cent will probably be exceeded by the payments for the present year, owing to the stronger tin market. A considerable revenue is derived from the sale of wolfram. The prospects of the venture are still good, though life estimates cannot be safely made.

The New Gopeng was floated in 1902, with a capital of £40,000, and holds 650 acres of ground. Last year's dividend was 20 per cent. An average output of 17 tons is recorded every month, from the ground broken by five monitors.

The Kinta Tin Mines, under the same management and in the same area, was floated in 1898, with a capital of £60,000, all issued. It has since paid 17 dividends, the 1905 distributions totalling 20 per cent. The ground now under attack, running little more than 1s. per yard, is yielding an average of 17 tons per month. An additional monthly income of $5,000 is derived from water-rights.

REDHILLS.—The Redhills, Ltd., a non-producing company under Messrs. Osborne & Chappel's management, should be adding to Perak outputs in a month or so. This concern was recently floated with the reasonable capital of £40,000 and holds a large body of gravelly alluvial, adjoining Pusing Lama. It is being equipped on highly economical lines, with a view to the saving of labor and effecting a high extraction, well in advance of the Perak standards. For the shifting of the ground, which contains from 10 to 15 per cent of tin-bearing rockfragments requiring pulverization, a steam navvy and a Blondin conveyor have been installed. By the agency of these, the dirt is dumped on an elevated place above the treatment plant, where it is further disintegrated by monitors before passing into longitudinal puddlers, below which are 1″ and ½″ and trommel. The classified rock is delivered into the 25 (850 lbs) stamp battery, whose pulp is concentrated on Wilfley and Bus tables. For the trommel sludge there will be 200′ of rifle boxes, 3′ 9″ wide, and graded at 1 in 20. A magnetic separator will be installed, as at Pusing Lama. It is estimated that 4 per cent. will be won from the crushed product, at a cost of 2 per cent. Taking the proposition generally, an average yield of $2.50 per yard should be recorded, or about 1,000 piculs per month. An extension of mill may be found advisable at later date, but this largely depends on the proportion of milling ore met with in actual working practice. Some consider that the 25 head battery will be unable to cope with the rock found, on the suggested basis of 1,000 tons of ground per diem.

SUCTION DREDGING.—Rambutan, Ltd., a daring project embarked upon by the same firm, is to-day being as critically watched as any venture in the four States. For it involves the utilization of the first suction dredge yet worked, on the paddock principle, on Malay alluvial tin. Its success or failure will be considered of great significance and determine whether, as one may reasonably anticipate, the dredge is to form an important factor in the industrial operations of the future. There are certainly many stretches of alluvial upon which such plants might be placed with fair prospects of success, but a pioneer has been needed to put the scheme to practical test. The gravelly alluvial to be dealt with at Tanjong Rambutan is low grade and gravelly. So far as can be determined, there is nothing in it liable to disable the large centrifugal pump, even though there may be occasional calls for new liners. A recovery of not more than 1*s*. per yard is expected, while costs may be 4*d*. or 5*d*.; but no precision can be introduced into these hazardous estimates, at present. The pontoon made of local hardwood, is 50× 50× 6′, and, with its burden of machinery, now being put into place, should weigh some 350 tons.

This dredge (Rambutan, Ltd.) is so designed as to draw from the a depth of 10′ vertical (16′ on incline) and to throw 40-50′. This means a working face of about 60′. A 16″ intake pipe serves the centrifugal gravel pump, which weighs 18 tons and is capable of putting through nearly 2,000 yards of solid per day. This plant is of Australian manufacture and is being erected by an Australian, Mr. Tobie—a fact not surprising when the experience of Australian and New Zealand engineers of dredging and dredging machinery is remembered. Rambutan, Ltd., is capitalized at only £27,000, which possibly means the fault of under-capitalization and a lack of reserve strength. However, this fault is always less harmful than excess of stock and, if found disadvantageous in the case of an Osborne & Chappel concern, could doubtless soon be remedied.

SOME OTHER EUROPEAN VENTURES.—Few other European ventures are of importance. The Chendai-Meru hydraulic mines, near Ipoh, held privately by Mr. Ogilvie, make good steady profits. The Kinta Association, whose chief holding is at Tanjong Rambutan, is making small profits, but is conserving its strength in the hope of obtaining some new property of value. This company, formed in Singapore in 1898, has paid dividends aggregating about 85 per cent on its ordinary share issue of $120,000 but its holdings have not proved inexhaustible. Mr. Petherbridge, the manager, hopes to be able to start hydraulicing on another section of the Rambutan property shortly, if further prospecting gives satisfactory indications.

SUNGEI BESI.—In Selangor and Negri Sembilan, where the European mining influence is comparatively inconsiderable, there are few properties of prominence. At Sungei Besi, an exceptionally large and deep opencaste is held by three Tronoh directors, by means of which a large and rich body of alluvial is to be worked. Chinese miners, by shafting, have in the past extracted large quantities of ground but by no means exhausted the mine, which the general manager, Mr. Grant Mackie, considers can be most economically and effectually dealt with on the lines adopted. A depth of about 80′ has been attained, and the floor of the circular mine is now on high-grade karong. Great difficulty has been experienced on account of slips. An enormous body of waste fell into the mine after the rains early this year. Production has been slowly proceeding since January, 1904, during which 2,800 piculs have been turned out. It is estimated that at least 20 tons of black tin will be produced per month, working at the rate of 400 yards puddled daily, but rich patches are likely to throw out all regular estimates. Costs should be low, when operations are proceeding smoothly. The exploitation of this deep ground by opencaste was at first regarded as a daring experiment in the neighborhood. A feature about the deposit is the purity of the tin-oxide, which is often of a light waxy appearance and is allowed a high metal percentage by the Straits Trading Company.

Rich Bunch.—At Salak, there is a very remarkable arsenical deposit, also being opencaste to considerable depth. This is privately held by Mr. Cummings and a few others. Before abandonment as unpayable, a borehole was put down to test greater depths and gave a good show of tin oxide and arsenical pyrites. Upon further mining, the body indicated was opened up and with the aid of a horizontal puddler, capable of treating up to 400 loads daily, tin at the rate of 25 tons per month was produced. At the time of the writer's visit, alluvial ground was being extracted by the basket (at a depth of 700′), that certainly ran 80-85 per cent tin oxide or, say, 55 per cent metal. How extensive such a wonderful enrichment can be, cannot be surmised, especially in view of the geologicall problems associated with the deposit. With the ore, though not intermixed, a large quantity of mispickel is found, as in many of the deep deposits.

Apropos the mixture of arsenical pyrites with the tin, customarily removed in calcining furnaces, it must be noted that Government regulations, prompted by the ill-effects of the fumes upon vegetation and perhaps livestock in various parts of the county, are to be made so stringent as to drive producers direct to the Straits Trading Company with their ore. This company, I hear, is now experimenting with mechanical separators which should remove the arsenical fume evil, whose seriousness in some districts has been very conspicuous.

Sipiau Tin Company.—In Negri Sembilan, the principal producers today, under European control, are hydraulicing in the neighborhood of the capital, Seremban. The Sipiau Tin Company, formed in 1899, with a capital of $230,000, is now working with two monitors on a body of decomposed pegmatite (micaless granite), through which several veins of tin stone run. One of these lodes has lately been traced for 500′ and tapped at several points about 30′ below the level of natural disintegration. It has not been possible to restrict the monitor cutting-face to the immediate region of these tin-carriers, and large bodies of practically barren ground have passed the riffle-boxes. An average of 20,000 yards is treated per month for nine tons of tin-oxide, of which four tons almost cover costs. The property is managed by Mr. Tedlie, who has done much hard and beneficial work for local mining during recent years.

Seremban Tin Company.—Not far distant Seremban Tin Company is controlled by Messrs. Osborne & Chappel and is perhaps the least noteworthy of the concerns managed by this firm. It was floated in Redruth, Cornwall, in 1898, with a capital of £20,000. An average yield of 8 tons of 70 per cent black tin is recorded from a large lowgrade deposit, with a 40′ face.

Held in Germany.—Sudu Seremban is held privately in Germany, and the old property is now almost exhausted. Five 2½″ monitors have been employed. Some months ago, an average of 15 tons per month was won from 60,000 cub. yds. The deposit lay on decomposed pegmatite, also containing quartz stringers. A 9 mile pipe line is an asset of the holders, which may be shortly turned to account on a new property whose acquisition is contemplated.

Pahang is a province which must necessarily be accorded delicate handling, for fear of irritating the tender susceptibilities of those whose faith in its *marvellous*,—though ill-defined and unsubstantial mineral wealth has been unshaken by the revelations of recent years. Perhaps it may be diffidently suggested, however, that the reputation of this *Cinderella* of the Federation has been largely based on the shadowy foundation of sentiment and conjecture, and that, although it can be justly claimed that Pahang is comparatively undeveloped and suffers sadly from lack of transport facilities, the country has not improved upon acquaintance. It seems that the tin has been ill-distributed on either side of the great granite dividing range, and that, although a gold field was thrown-in by way of make-weight on the east, the west has infinitely the best of the measure.

The Eastern State.—The field under exploitation by the Pahang Corporation in the Kuantan District falls under a different category and, despite the peculiar transport, fuel, and labor difficulties encountered by this plucky concern in the past, is likely to retrieve its former prosperity. So ample and straightforward are the circulars and annual reports published by the company, that only brief reference to its position need here be made. After years of variable results (illustrated by its profits for the last six years, viz:—£27,321, £5,193, £22,240, £11,548, £3,076, and £2,302) the entire proposition, underground and on surface, is now undergoing complete transformation, which must in large measure check the troubles complained of so long. By the installation of the electric power scheme and of new mills with heavier stamps and new dressing floors, the company will overcome the evergrowing fuel difficulty, make themselves less dependent on a peculiarly poor labor-supply, and effect a higher extraction from the unoxidized ore of the lower levels. Five hundred coolies will be released from wood-cutting.

A Masticator.—The old battery was insufficiently powerful—was unable to properly *masticate its food*. The Pahang Corporation is a concern of many lodes, which run as fissures through the granites and metamorphosed and sedimentary rocks, associated with copper, tourmaline, chlorite, and mica. It has been pointed out that the decreased profits of the past year or so have been due to increased working costs and a falling-off in grade, which was 2.9 per cent in 1903 and 1.9 in 1905. Under the new conditions, the greater scale of working and the introduction of additional labor-saving appliances should satisfactorily influence costs, and the advance in the price of tin, especially appreciated by so mechanical a venture, has been equivalent to a large increase in the value of ore reserves. The prospects of the company have, indeed, been happily improved, although it must ever bear the burden of a heavy capital.

EXPERIMENTAL TUBE-MILLING IN A KOREAN GOLD MINE

Writing to the *Mining and Scientific Press* (San Francisco), recently, A E. Drucker, M. E., of Chittabalbie, Korea, says:—

We are at present experimenting on a practical scale with regrinding our concentrate in a tube-mill with cyanide solution. It occurred to me some months ago that cyanide solution could be used just as well as water, when reducing our concentrate to slime, and incidentally some of the gold could be extracted while grinding. In other words, the tube-mill could be used as a grinder and agitator combined.

This company (Oriental Consolidated Mining Company) has constructed an experimental plant consisting of one tube-mill (2½ × 12½′), two mechanical agitators with plow shoes (8 × 6′ diam.), three filter and settling-boxes (4×5×5′), 48 separate-compartment zinc-boxes, two sumps, and one stock-solution vat. An electric motor furnishes the necessary power. The tube-mill was constructed in this company's shops.

The method is a continuous one; the concentrate is put into the hopper with cyanide solution and upon passing through the tube-mill is nearly all ground to slime and a good percentage of the gold is extracted. At the end of the mill is a spitzkasten (3″ wide by 1½′ long by 1½′ deep) supplied with clear water from the bottom. When discharges from the bottom of the spitzkasten is coarse concentrate and clear water, that passing over the spitzkasten is the cyanide solution and slime. The coarse concentrate that may escape from the tube-mill is caught in the settling-boxes and again reground, while the overflow contains very little value (tests 0.005 to 0.01 per cent KCN and assays 6 cents per ton). We can not arrange to run this overflow or waste-water solution through a separate line of zinc-boxes. In this small plant the value of this waste solution will not amount to more than $2 to $3 in 24 hours. The slime concentrate and cyanide solution pass on to an agitator which has been set in motion (13 r. p. m.) and the muller lowered: Here the product is agitated for about 15 hours, the muller is then raised 2′, the agitator stopped and the concentrate allowed to settle. It takes about 1 hour to settle clear; by the addition of some milk-of lime it could be made to settle in half an hour. I prefer to use as little lime as possible because the strong alkaline solution consumes a large amount of zinc. The clear cyanide solution is decanted by a float siphon into filter-boxes and from there it is run through the zinc-boxes and the gold precipitated. Next, the strong precipitated cyanide solution from the sump is pumped up to the agitator as a wash to partly remove the gold remaining within the settled concentrate. The muller is allowed to work down on the charge and agitate for a few minutes, then settled and decanted. Following this come two successive weak cyanide washes to remove cyanide and gold, and finally a water-wash which is run through a row of zinc-boxes to waste. Now the charge of about 5 tons of clean concentrate is ready to be discharged into the creek. A little water is added, the discharge-muller set in motion and lowered, the discharge-hole opened, and now the agitator will discharge itself readily and prepare for a new charge. The total treatment takes 24 hours, both agitation and decantation being done in the agitators.

(Continued on page 203.)

CRUDE OIL FOR JAPAN

A contract has been signed between three of the leading oil companies of California, *viz*, Union Oil Company of Los Angeles, Associated Oil Company of San Francisco, and Graciosa Oil Company of California, and the Toyo Kisen Kaisha (Oriental Steamship Company), of Japan, for the delivery of 500,000 bbls. of crude oil *per annum* for 10 years. It is understood that this oil is to be used as fuel for various Japanese steamers. It is further intimated that still greater oil transactions have been inaugurated by Mr. Henry Crocker, of California, in connection with prominent Japanese and with the Graciosa Oil Company. As a result it is expected that three large refineries will be erected in Japan, one at Yokohama, one at Kobé, and another at Moji. The new tariff gives a 20 per cent duty on crude oil and a duty on refined oil of about 40 per cent. This difference in duty between the crude and refined oil, together with the market advantages for the by-products, makes a very comfortable working margin for the refineries located in Japan. This very large transaction in California oil will necessitate the operation of a line of tank steamers between California and Japan; and it is understood that contracts have been arranged for the construction in Japan, and the operation under the Japanese flag, of five large tank steamers for carrying this crude oil to the Japanese refineries. This deal means a remarkable advantage to the California oil fields; but it will signify a great deal more for the Japanese merchant marine and for the industrial expansion of Japan. If the Japanese Government supports this new industrial development with the same national spirit that it gives to all other important enterprises, it will result in the Government practically sustaining and assisting in the development of a great Japanese oil industry. The steamers for carrying this oil will be constructed under a Japanese subsidy, the industry will be further protected by a tariff, and no doubt further aid will be given in trasportation of the products into the markets of China, if it shall become necessary.

IRRIGATING TREAD-PUMP IN COMMON USE ON CHINESE FARMS

PUMPING MACHINERY FOR CHINA

Consul-General James L. Rodgers, writing from Shanghai, his post, to the Department of Commerce and Labor at Washington, recently said that while the demand for steam pumps and hydraulic machinery is not now much in evidence in China, it will probably develop slowly along with other lines, the Chinese of late having exhibited great interest in all classes of machinery. However, with cheap labor and the peculiar and crude but effective Chinese pumps, it may be expected that the use of such modern devices for a long time will be confined almost exclusively to cities. The water wheel, turned by the buffalo, and the tread pumps, operated by the coolies, will be difficult to supplant for irrigation work, and it is hard to imagine any other use to which a steam pump could be put in the country districts under the present economy of the people.

JAPAN'S INDUSTRIAL ENTERPRISE

Reference has already been made in our columns to the extraordinary activity that prevails in industrial circles of Japan, for the promotion of new enterprises and the extension of existing works, and it is interesting to make a closer study into the nature of the newly-promoted companies and to consider the amount of capital involved. The following table shows the principal undertakings newly projected and the amount of capital to be invested. Some of these have already completed the first call on their shares, others are now making the first call, while the majority are still in an initial stage:—

		Capital.
Rumoe Colliery Co.	-Y-	1,000,000
Tokyo Trust Co.		1,000,000
Kushiro Colliery Co.		2,000,000
Japan Match Co.		600,000
Meiji Iron Works Co.		500,000
Mankan Salt Co.		1,500,000
Banzai Life Insurance Co.		500,000
Tozai Petroleum Co.		1,500,000
Otaru Timber Co.		1,500,000
Imperial Flour Mill Co.		500,000
Japan Patent Medicine Co.		200,000
Tokyo Electric Power Co.		6,000,000
Silk and Cotton Spinning Co.		3,500,000
Japan Marine Produce Co.		3,000,000
Kokura Railway Co.		3,500,000
Mutual Fire Insurance Co.		1,000,000
Imperial Fertiliser Co.		3,000,000
East Asia Flour Mill Co.		2,000,000
Oriental Timber Co.		500,000
[The above are promoted in Tokyo.]		
Hogo Petroleum Co.		1,000,000
Asahi Fishery Co.		200,000
Japan Solid Fertiliser Co.		200,000
Korea Raw Cotton Co.		200,000
Daisei Cotton Spinning Co.		2,000,000
Osaka Industrial Co.		200,000
Ojigawa Electric Power Co.		12,500,000
Union Fire Insurance Co.		5,000,000
Kyoto Street Railway Co.		3,500,000
Kyoto-Osaka Electric Railway Co.		7,000,000
Oriental Marine Produce Co.		500,000
Artificial Fertilizer Co.		700,000
Tsushima Electric Power Co.		1,000,000
Nagoya Gas Co.		2,000,000
Tokai Warehouse Co.		1,000,000
Nagoya Electric Power Co.		2,000,000
Japan Silk Refining Co.		100,000
Yokohama Sugar Refining Co.		1,500,000
Yokohama Fertilizer Co.		1,000,000
Kii Timber Co.		100,000
Sulphuric Acid Fertilizer Co.		200,000
Korea Colonization Co.		1,000,000
Manchuria Electric Light Co.		250,000
Japan-China Fire Insurance Co.		5,000,000
Glass Manufacturing Co.		1,500,000
Anglo-Japanese Bank		20,000,000
Shanghai Silk Spinning Co.		590,000
Total		-Y-104,740,000

Of the various enterprises enumerated above, those in which Japanese and foreigners are conjointly interested are estimated to amount to something like -Y-28,000,000. Although the exact amount of the share of the Japanese capitalists in these joint enterprises is not definitely known, it would be nearer the mark—by adding those which may have been omitted in the foregoing table and the first call of the South Manchuria Railway Company, amounting to -Y-20,000,000—to estimate the aggregate capital of the new undertakings so far made public at between -Y-100,000,000 to -Y-120,000,000. Needless to say, the Tokyo capitalists come in for the lion's share in the new enterprises, their quota being 34 per cent of the whole. Comparatively few new industries are projected in Osaka, though the extension of many existing factories is under contemplation. It is believed, however, that sooner or later Osaka will be infected by the industrial mania which is now at its height in Tokyo.

Some of the following companies have already increased their capital or have undertaken the issue of debentures, while others are considering the advisability of similar steps:—

		Increased capital or loan.
Iyo Electric Power Co.	-Y-	180,000
Tokai Electric Power Co.		250,000
Japan Credit Mobilier		7,500,000
Tokyo Stock Exchange		2,750,000
Tokyo Marine Insurance Co.		500,000
Hakodate Dock Co.		600,000
Kawasaki Shipbuilding Works		6,000,000
Osaka Alkali Co.		440,000
Owasi Clock Manufacturing Co.		176,000
Kyoto Cotton Flannel Co.		600,000
Japan Raw Cotton Co.		1,000,000
Union Cotton Spinning Co.		800,000
Temma Weaving Co.		500,000
Osaka Ryuso Fertilizer Co.		500,000
Mikawa Cement Co.		100,000
Settsu Oil Co.		500,000
Tokyo Fire Insurance Co.		5,000,000
18th Bank		1,750,000
Tokyo Electric Light Co.		1,850,000
Fruit Wine Co.		300,000
65th Bank		500,000
Marusan Beer Co.		1,550,000
		-Y-33,706,000

Adding the amount of capital required for extension of existing works to that of new undertakings, the total will come to between -Y-100,000,000 and -Y-150,000,000. The large amount of funds involved in the enterprises conjointly promoted by foreigners and Japanese is deserving of particular attention.—*Hongkong Telegraph.*

BRIGHT GOLD-MINING PROSPECTS IN THE PROVINCE OF BENGUET, P. I.

In an official report, Governor Pack, of the Province of Benguet, P. I., speaks encouragingly and almost enthusiastically of the prospects for gold mining in his province. He says:—

We have felt heretofore that in our report regarding the mineral resources of this province the conservative course was the wisest to pursue, and that a steady, sure, continuous expansion in the knowledge of our mineral wealth, and the diffusion of such knowledge rather than mere guesswork based upon the researches of amateur prospectors, would finally produce the best results.

This is not a prospectors' ideal gold-field. Our gold does not lie in pockets where by luck and after much research a fortune may be picked up in a day; and the average prospector of the Philippines may for this reason consistently give adverse report against the reports of wealth in gold in Benguet.

Our products of gold are to be found in what is generally classed as low-grade ore, though throughout the mineral range are found seams of various thickness which are exceptionally rich, and it is the rule rather than the exception to find all assays of mineral-bearing ore exceeding in value $10 per ton.

Practically all of the central range through the province is mineral bearing, as well as the eastern range, or central range of the District of Kayapa, also a part of this province. With a large field of gold-producing ore there can be no question but that we safely may present and solicit the attention of capitalists desiring safe investment, to the subject of mining in Benguet as a business proposition, not a prospect.

Whereas in the past this was an inaccessible district, now transportation is made available by the opening of the Benguet-rd and its maintenance throughout the year. Thus the investor may surely, safely, and, compared with the past, at small expense, transport his machinery to location. With the limited means available at present the provincial authorities will do all possible to construct main roads toward mining localities, thus farther facilitating transportation for those enterprises which would so much benefit the province.

We are now entering on that era in which we shall no longer speak of mining prospects but of mines. Hundreds of prospectors have come and gone; we now have miners and mine corporations, constructing and operating. There have been 544 mining claims located within the province, of which 105 have been located in the past year.

The Benguet Consolidated Mining Company, represented by Mr. Eye, a mining engineer from Colorado Springs, Colorado, with a capital of $200,000, has almost completed a new plant with modern equipment with a capacity in its cyanide plates and stamp machinery of about 60 tons of ore per day. They are located in the Antimok mining district and in their ore and dirt find only the one mineral—gold. Ore is easily crushed and the assays average $14.80 per ton. Mr. Eye reports this to be an ideal mining country, calling my attention to the fact which will interest practical men,

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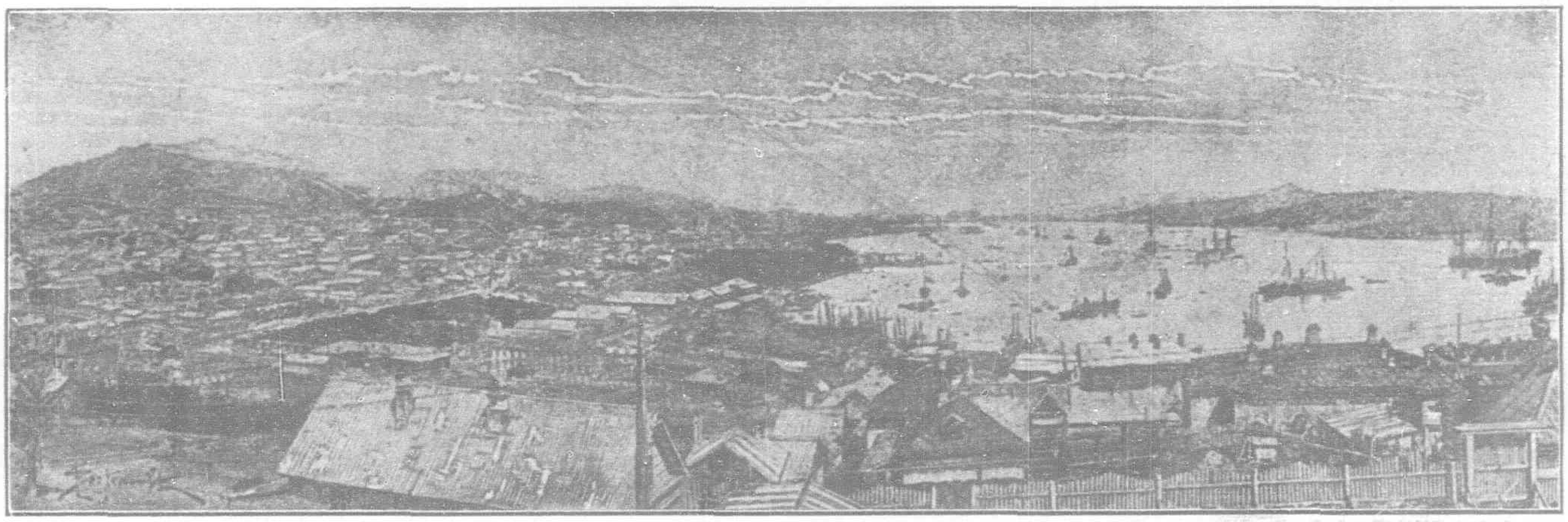
MUNICIPALITY OF VLADIVOSTOK PROJECTS LARGE PUBLIC WORKS

Since the restoration of peace between Russia and Japan, the Municipality of Vladivostok has been consumating plans for the construction of a series of public works which will require an expenditure of at least $6,000,000 gold. The authorities have in mind the creation of a loan for the granting of concessions to carry out the enterprise, and some features of the general proposition may be inviting to foreign enterprise and capital.



CITY OF VLADIVOSTOK, WHERE MANY PUBLIC WORKS ARE PROJECTED

Some Urgent Works.—The most urgent of these improvements, as set forth by Mr. Roger S. Green, American Commercial Agent at Vladivostok, are waterworks, sewerage system; an electric railway, light and power system, building of wharves and warehouses on Golden Horn Bay, the construction of a small harbor for coasting vessels on Amur Bay near the market, the building of markets, and the paving of streets. The city also wishes to erect a large building, or series of buildings, on the ground now occupied by the city garden, the basements to be used for storage of merchandise, the rear being right on the wharves, and the other floors for offices, part to be set aside for an exchange or chamber of commerce, for municipal offices, for the municipal bank and library, and for a theater and club. The erection of buildings for cheap lodging houses is also planned. Rents are now so high that an unfurnished apartment of five rooms, for instance, even at some distance from the business center, can not be secured for less than $100 gold per month. A steam bakery, steam laundry, a public bath house, a slaughterhouse, and small electric ferries on the bay are also among the improvements proposed. More hospitals, schools and gardens, boulevards, places for sea bathing, etc., are desired. An addition of $250,000 gold is needed for the capital stock of the municipal bank and for a Mont de Piété or city pawn shop.

Methods of Payment—The municipality has no funds available for beginning by itself this somewhat ambitious program, but it is felt that these undertakings, if properly managed, should most of them be profitable investments. The municipality is desirous of securing a loan for the purpose of undertaking the construction and management itself, but it is pretty generally realized that there may be difficulty in getting the money in this way, and therefore it is also open to propositions for (1) a loan secured on the work undertaken, the construction to be by the lenders or otherwise under their control; or (2) a regular concession for construction and operation, the franchise to last preferably not longer than 20 years. No definite outline of the conditions prescribed has been formed, and a proposition that required harder conditions in certain ways would have a chance of acceptance on account of other favorable points, such, for example, as exceptional solidity and standing of the applicants and guaranties for prompt and satisfactory execution of contracts.

The city has no funded debt at present, but owes to the central Government some $150,000 gold for provisions supplied in anticipation of a siege during the war, and about $100,000 short-time loans have been recently negotiated for a hospital and a school building. On the other hand, it owns all the vacant land on the peninsula, on which Vladivostok is situated, for a distance of some 13 miles, and still holds a great deal of valuable land in the city itself, which could be used as security indirectly, though a foreign corporation or person could not hold it itself. It also owns warehouses which bring in a good income. Lenders could not count on securing any interest or sinking-fund payments from the present revenues of the city, but would have to base their calculations on securing the return from the works constructed. The revenues and expenditures of the city ordinarily balance exactly. This year it is estimated that they will each come to about $300,000 gold. A loan or concession would require the approval of the central Government.

Vladivostok has a population, civil and military, of probably about 100,000, it being impossible to state the number accurately on account of the policy of secrecy maintained regarding military matters. The city is built on the shores of Golden Horn Bay and on the hills, which here begin to rise almost from the water's edge. To avoid ascending the hills too far, the city has extended itself along the shore, and is thus stretched out to a length of about 7 miles, disproportionate to its area; but there are a good many houses as high as 150′ above the sea, the streets leading to them being very steep.

Waterworks and Street Railway.—The waterworks proposal presents some serious difficulties, as in order to secure a sufficient supply of water it will probably be necessary to go out about 35 miles to the Maike River and two or three pumping stations would be required to get the water over some of the intervening hills. It has also been suggested that the pipes be carried under Amur Bay to the Mangugai River, but the distance would be about the same and would include not less than 6 miles of pipe under the bay, which has an average depth of 42′ and is in some places as deep as 48′. It is estimated that from 550,000 to 800,000 galls. of water will be required daily. The severe winter, during which the ground freezes to a depth of about 5′ is an important factor to be considered. The naval station and the railway have waterworks of their own.

The street railway and electric lighting propositions are the most attractive at present. The great amount of traffic on the one or two principal streets would make it possible for a railway to serve a very large number of people with a comparatively short and simple system, the present idea being to construct a line from the eastern end of the town, along the main street to the railroad station and to the market. One branch line northward into the country on Aleutskaya or Kitaiskaya streets to First River, about 3 miles, would probably be also popular, as it would permit people to live in the suburbs of the town. A number of houses have been built in that direction already. There would probably be a good chance for a line around the bay as well. First and second class cars would probably be necessary here. Altogether about 8 miles of line should be constructed. The streets are for the most part wide enough to accommodate a double track.

As regards lighting, there are already a number of private plants, most of which supply other houses in their vicinity. This would be an important matter to be considered if concession were applied for. The city at present states that it will want for street lighting to begin with about 200 lights of 1,000 and 500 candlepower, and it is estimated that the private consumption will be from 5,000 to 7,000 lights of average candlepower. An increase would of course depend on the price and on the arrangements that could be made for limiting the private plants.

Wharves, Warehouses, and Markets.—The wharves in Golden Horn Bay should have a frontage of about 3,500′. The warehouses are to be of two classes: Those for safe-keeping of goods for long periods, which should accommodate 129,000 tons; and those to shelter transit cargo, which should have a capacity of 261,300 tons—some to be built of brick, and some of steel and galvanized iron, or other cheap fireproof construction, according to the goods to be stored.

On Amur Bay simply a strong embankment will be necessary for about 1,750′ and a short breakwater, about 100′ long in comparatively shallow water; this is for the use of the small sailing craft in the local and coastwise trade.

A very large market will be required. Near the present building temporary booths covering 2 or 3 acres have been set up.

The main streets in immediate need of paving have an area of 490,000 sq. ft.

Capital and Experience Required.—Judging from present appearances it would seem that if this enterprise were taken up with proper caution and tact by parties of whose bona fides there could be no doubt, and who could command the necessary capital or credit, a concession might be obtained for all or part of these works. If persons desired to make a loan to the city for the purpose, advantageous terms could probably be obtained, as the rate of interest commonly prevailing here is very high. The whole sum of $6,000,000 gold would not of course be needed at once, but would be spread over several years. It is understood that several proposals have already been made to the city, but on account of the lack of standing of the promoters, or because the conditions they propose are not satisfactory, they have not been accepted. It is most essential that parties applying for the concession should have large capital and experience to command the confidence of the municipality and of the central Government.

FUTURE OF THE CITY.—Of course such an investment would require confidence in the future of the city, on which subject interested parties must investigate and form their own opinions. Vladivostok is likely to continue to be at least as important as now and it is believed these works could be made to pay on the present basis. This leaves out of consideration the tremendous growth possible with the rich country back of this port. As has often been pointed out, while Vladivostok is not an "ice-free" port, by the use of an ice breaker ships are regularly enabled to enter and leave the harbor during the months of January and February when the ice forms, and as the railroad service develops a large transit trade will undoubtedly grow up here.

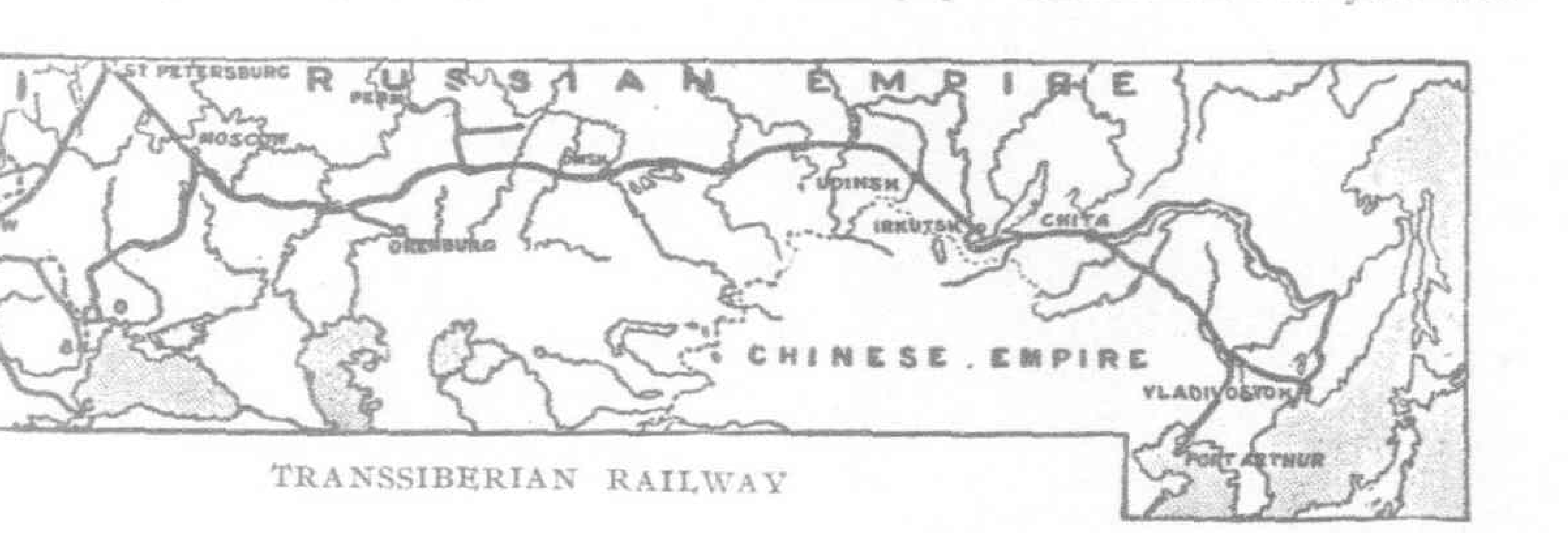
From the point of view of the general interests of American trade, it would be a tremendous advantage if such a foothold could be obtained in Siberia. These works would require a very large amount of imported material, and being a practical demonstration the start thus obtained would be very valuable.

Persons interested in this matter should communicate with the Mayor of the City of Vladivostok, and, if possible, should send a competent engineer who could make on the ground definite proposals for submission to the city. They must bear in mind that many difficulties will arise and that a satisfactory result can not be obtained without much patience, careful planning, and allowance for local conditions. The disadvantages may appear too great for some, but the various projects are said to be well worth an investigation.

RUSSIA PLANS TO REJUVENATE HER ORIENTAL TRADE

Passenger service by the Transsiberian Route having been resumed, first by one weekly express, and, since July 6th, by a second, travelers can now make the journey from Vladivostok to Moscow in 11½ days, with only one change of cars—at Irkutsk. The trains leave Vladivostok on Mondays and Fridays at 8:03 a. m., connecting with the weekly mail steamers of the Russian East Asiatic Company from China and Japan. Both first- and second-class cars give comfortable accommodations, the former being divided into compartments of two berths, while in the second-class compartments there are four berths. In the dining car attached to each train a table d'hôte dinner is served in the middle of the day for about 77 cents gold, while in the morning and evening meals may be ordered à la carte. The rates from Vladivostok, including cost of berths, are as follows, prices being given in gold:—

	1st-class	*2nd-class.*
Harbin	$22.20	$13.87
Irkutsk	70.57	44.88
Moscow	132.65	86.91
St. Petersburg	138.42	90.62



TRANSSIBERIAN RAILWAY

Only 54 lbs. of baggage may be checked free of charge by either first- or second-class passengers. For excess baggage the charge is $1.38 gold per 9 lbs. to Moscow, and $1.42 to St. Petersburg. Very large pieces can be carried in the sleeping cars, provided they are in the form of valises, etc.; and there are numerous racks in the corridors and elsewhere in which they can be kept out of the way. The baggage of western-bound passengers is examined at the station "Manchuria," and that of the east-bound passengers at Pogranichnaya, or, if desired, at Vladivostok. Hitherto these examinations have caused little inconvenience.

In this connection Russia's railroad movements in the Far East may be of interest. One of the most important of these is the announcement that the Ussuri Railroad, built and operated by the Russians, will be placed under the management of the Chinese Eastern Railway Company under terms not yet made public. It was realized that a much better and more economical through service could be given if these two links in the Transsiberian Route were under a single administration. Hitherto the 144 miles of the Ussuri Railroad, connecting the 920 miles of the Chinese Eastern Railway section across Manchuria with the sea, have been managed quite independently, making it difficult to organize any cheap and efficient through service, which both the railroads and the country need. An independent road like the Chinese Eastern may be better able to attract shippers and to foster promising new industries. As the whole Ussuri road is surrendered, the Chinese Eastern Railway gets also the line from Kikolsk to Habarovsk, 408 miles in length, which connects Vladivostok with the Amur River.

The construction of an Amur railroad between Stretensk and Habarovsk appears now to have been definitely placed on the Government's program for the near future. Telegraph reports state that the commission of the railway department recommends the immediate undertaking by the Government of the construction of the section from Stretensk, the present terminus of the Transbaikal branch line from Karymskaya, to the confluence of the Shikla and Argun rivers at Pokrofka, a distance of about 240 miles. It is estimated that this extension will cost about $22,000,000 gold.

Russia seems determined to do all in her power to recuperate her Oriental trade and to advance her commercial interests in the Far East. To this end she has been systematically at work granting subsidies to lines of steamships plying between her own ports and those of China, Japan, and other ports of Asia. Contracts have been made this year by the central Government for subsidized steamship services from Vladivostok to ports of China and Japan and also along the coast to Nikolaiefsk, Petropavlovsk, and way ports. The contract for the China and Japan lines is for one year and was given to the Russian East Asiatic Steamship Company, which is closely connected with the Danish East Asiatic Company. It provides: First, for a weekly mail and passenger steamer from Vladivostok to the Japanese port of Tsuruga, which lies to the southeast on the Japan Sea. This trip is scheduled to be made in 38 hours, and from Tsuruga, Kobé, and Osaka can be reached by train in eight hours, and Tokyo in 14 hours. Secondly for a weekly mail and passenger steamer from Vladivostok to Shanghai *via* Nagasaki and back by the same route. The voyage from Vladivostok to Nagasaki takes about 50 hours and the whole run to Shanghai about four days. Thirdly, for a freight and passenger line from Vladivostok to the ports of Gensan, Fusan, Nagasaki, Chemulpo. Shanghai, Chefoo, and Dalny and return, sailings to be once in two weeks.

It is provided that the speed of the mail and passenger steamers must be not less than 13 miles an hour, and of the freight and passenger steamers not less than 10 miles an hour, and it is stipulated that the sailings must be timed to give good connections with Russian and foreign railroad and steamship lines as the Russian Government may direct.

The chartering of foreign steamers is allowed. Mail steamers must have accommodations for 80 first-class and 300 third-class passengers and a cargo capacity of 1,500 tons. The freight steamers must accommodate 25 first-class and 200 third-class passengers and be able to carry 1,500 tons of cargo. Russian mails and mails from foreign ports for Russia are to be carried free, as well as the postal clerk to sort them, but the clerk is to be charged half the regular rate for his board When so ordered by Russian diplomatic or consular officers, the vessels must carry free Russian subjects found abroad in a destitute condition, but not more than five on each steamer. Freight and passenger rates are not to exceed a maximum approved by the department of commerce and industry.

For delay in departure or arrival the mail steamers are subject to a fine of $25 an hour and the freight steamers to a fine of $12.50 an hour. If the delay is caused by inopportune acceptance of cargo or by touching at a port not indicated in the schedule, the fine is to be doubled. For leaving a port before the scheduled time a fine of $500 is to be imposed on the mail steamers and of $250 on the freight steamers. The fines for omitting the whole or part of a voyage are respectively $2,500 and $1,250 for the two classes of steamers. If delay is due to fogs, storms, lateness of express trains, or other reasonable causes, no fines are to be imposed. Moreover, if on account of late departure from one port the sailings from succeeding ports should also be delayed, only one fine is incurred, though efforts should be made to make up time lost.

If the company fails twice to complete a voyage, the Government may cancel the contract, transfer the business to another company, impose a fine of $25,000, and cancel all obligations of the Government to the company.

The Russian East Asiatic Steamship Company also has a contract for a coasting line between Vladivostok and Nikolaiefsk, with stops at six ports each way. Fourteen voyages must be made during the present season. A speed of 10 miles an hour and a cargo capacity of 1,000 tons are required for the vessels employed, which may be under a foreign flag. Maximum freight and passenger rates are fixed, and it is provided that troops shall be carried at half rates. Government mails and couriers are to be carried free. Fines are to be imposed of $125 for a day's delay in arrival or departure from a port, of $250 for leaving port before the appointed time or for omitting any port, of $750 for omitting a voyage or any part of it, and of double the amount for a second offense. If a steamer is held by the Government, $125 be paid for each day, Sundays excepted.

The subsidies to be paid to the Russian East Asiatic Steamship Company for all these services have been kept secret, but it is said that they amount to about $375,000 for the year.

A third contract has been made with the Russ Steamship Company for a line from Vladivostok to the ports of the Okhotsk and Bering seas, the Commodore Islands, and the Chukotsk Peninsula. During the present season four voyages are to be made, aggregating nearly 28,500 miles. The steamers must have a speed of not less than 8 miles an hour and a cargo capacity of not less than 1,000 tons. Foreign steamers may be used. The subsidy in this case is fixed at $107,500 for the four voyages, including one trip from Petropavlovsk to the mouth of the Anadir River. Delay in leaving port renders the company liable to a fine of $125 for each day lost, while the Government is obliged to pay the company the same amount if it holds a steamer. For failure to call at an appointed port the company is to be fined $2,500, while if a ship does not return to Vladivostok within five days of the scheduled date a fine of $125 is incurred for every succeeding day of delay. Government mails and couriers are to be carried free, and maximum rates are fixed for freight and passenger charges.

HONGKONG AND SHANGHAI BANK

The half-yearly report and balance-sheet of the Hongkong and Shanghai Banking Corporation again discloses a highly satisfactory state of affairs. An examination of the detailed figures exhibits the strength of the position, which must be gratifying to the directors and manager. The silver reserve fund now stands at considerably over $10,000,000. A dividend is declared of £1.15s. sterling per share, while a balance of $1,712,242 is carried forward to next account.

PROBABLE ORIGIN AND COURSE OF THE HONGKONG TYPHOON

(By the Rev. José Algué, S. J., Director of the Philippine Weather Bureau)

In a letter from Zikawei dated September 22d, 1906, and published in the *North-China Daily News*, we read the following concerning this typhoon:—

> The storm was a typhoon with a narrow diameter, but regularly shaped—somewhat of the type of one which took the coast between Amoy and Swatow during the night of the 9th instant. The first signs of the new disturbance were once more given by the Japanese observations in the islands east of Formosa, the importance of which can not be overestimated. With these and the telegrams from Formosa we were enabled to send the first warning: "Typhoon south of Meiaco-Sima" to put ships leaving for the south upon their guard. This was cabled to the China Coast semaphores on Saturday, 15th, at 11:30 a. m.

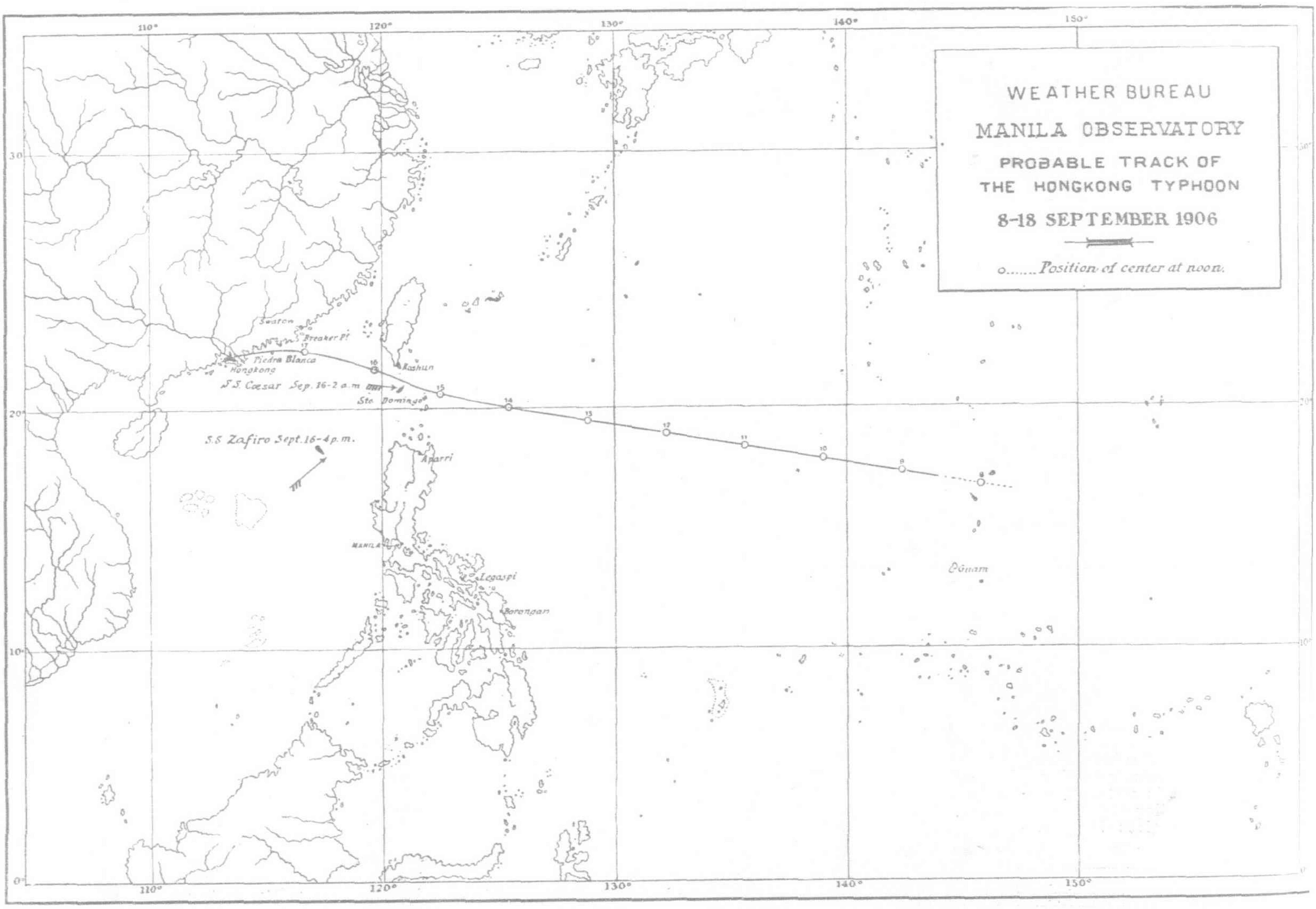
This statement of Zikawei Observatory has proven to be correct from the observations of our stations at Santo Domingo de Basco and Aparri. It is very probable that this storm came from the Pacific in a regular way. Two depressions were slightly felt in our station of Guam in the first half of September: one on the afternoon of the 8th. The barometer gave the lowest reading for the month (754.92 mm.) at 2 p. m. this day, and the wind veered from the west to the SE. through the south. Granted now that some depression crossed at 200 miles north of Guam at about 11 a. m. of the 8th, it may be reasonably supposed that this was the one which on the 15th reached Santo Domingo with an average velocity of some 8 nautical miles an hour, as the distance from Guam to Santo Domingo is nearly 1,400 miles. This supposition may be strengthened by the fact that in our easternmost station, Borongan, in Samar Island, which is entirely open to the Pacific, the movement of the lower clouds showed evidently the passage of a depression through its north. In fact, the lower clouds in this station were observed coming from the NW. during the afternoon of the 11th, from the W. at 2 p. m. of the 12th, from the WSW. at 2 p. m. of the 13th, from the WSW. at 2 p. m. of the 14th, and finally from the SW. at 2 p. m. of the 15th. One inch of rain was collected at this station on the 14th. The clouds were observed coming from WSW. on the 12th and the 14th in Legaspi, the most eastern station of Luzon. But, however this may be, it is a matter of fact that a regularly shaped cyclone crossed north of our station of Santo Domingo in the afternoon of the 15th.

Santo Domingo Meteorological Observations.—It appears from observations taken at Santo Domingo (latitude, 20° 28′ north; longitude, 121° 59′ east):—

(*a*) That a typhoon crossed close through the north of that station from 3 to 4 p. m. of the 15th; the barometric minimum was 743.98 millimeters at 2:30 p. m., that of Hongkong 739.89 millimeters at 9:35 a. m. of the 18th.

(*b*) It further appears from the shifting of the clouds from NW. to SSW. and of the wind from NNW. to S. that in the afternoon of the 15th the center moved in the direction NW. by W.

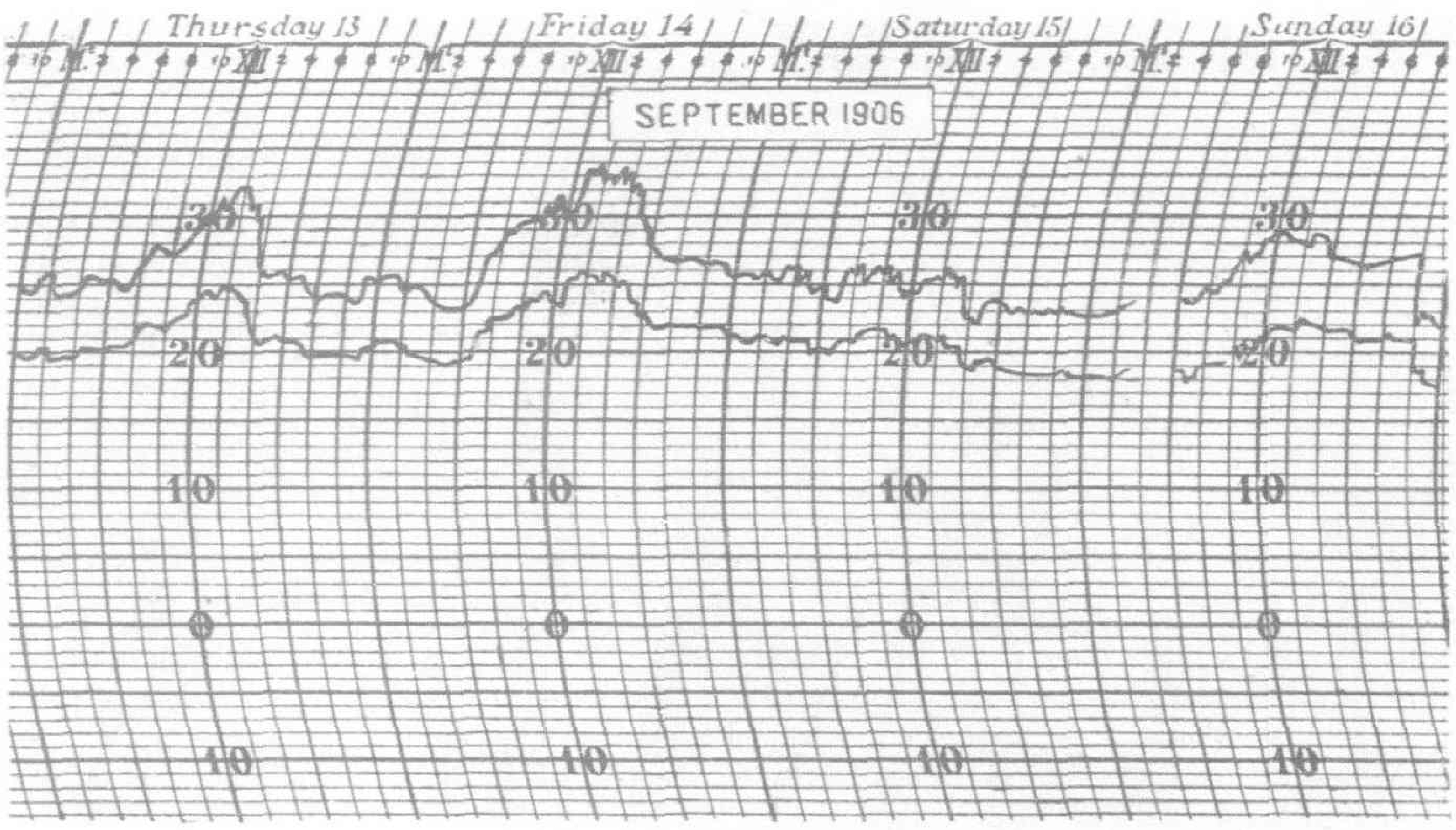
(*c*) It is also remarkable that there was a decided falling of the temperature during the passage of the center from 10 a. m. to 10 p. m., and an increase of the vapor tension from 6 a. m. to 4 p. m. The fall of the temperature between 3 and 4 p. m. is very striking in the record of the psychrograph.



(*d*) I call attention to another fact; that is, from midnight the barometer was decidedly falling up to 10 a. m., and therefore the semi-oscillation was lost; or, in other words, the pressure was falling since 3 a. m. instead of rising. This alteration of the barometric oscillation is always a sign of an impending atmospheric disturbance.

Simultaneous Station Observations.—If we compare the simultaneous observations of Koshun (South Cape), Santo Domingo, and Aparri, they will show (*a*) that the body of this typhoon was rather small, as at 6 a. m. of the 15th in Koshun and in Aparri neither the winds nor the barometer indicated the presence of any disturbance; only the clouds in Aparri indicated the crossing of the typhoon, as they moved from the N. on the 14th and shifted SW. on the 15th in the afternoon; (*b*) as the winds were stronger at Koshun than at Santo Domingo, we must conclude that the storm, as it advanced through the Bashi Channel into the China Sea, increased in strength inasmuch as Santo Domingo has been closer to the center than Koshun; (*c*) the winds at Koshun show also that the center moved to the NW. by W., as in the afternoon of the 16th it was nearly due W. of South Cape. This is also confirmed by the report of the captain of the steamer *Océanien*, who experienced the passage of the center through his south at a distance when the ship was not very far from Breaker Point.

Center Makes a Curve.—The center then made quite a curve from Santo Domingo to Hongkong, a distance of nearly 530 miles, as shown on the accompanying chart. Then, according to the birograms from Santo Domingo to Hongkong, this track was run in 66 hours, from 4 p. m. of the 15th to 10 a. m. of the 18th, or with an average velocity of 8 miles an hour



CURVES TRACED BY THE PSYCHROGRAPH AT SANTO DOMINGO DE BASCO (BATANES ISLANDS)

The steamship *Zafiro*, bound to Manila, and which left Hongkong on the afternoon of the 15th, experienced the effect of this storm when in parallel 18° 20′ north and in the meridian 117° 17′ at 4 p. m. of the 16th; the barometric reading was 755.73 millimeters and the wind from SW. increasing in force until midnight; the center was passing through the NNE. of the ship at 4 p. m. at a distance of about 240 miles, which may be considered the shortest distance from the vortex to the ship. This fact confirms the statement that the gradient near the center was considerably sharp and the low isobars of very small diameter.

Another report confirms also the inclination of the vortex to the NW. and its movement parallel to it, or to W. by S. The British steamer *Kneichow* reports:—

> Fine weather, NE. winds, and smooth sea to Swatow. On the morning of the 18th, from 1 a. m. to 6 a. m., experienced furious typhoon to ESE. of Pedra-Branca Islet. At 3:45 a. m. center of typhoon passed nearly over ship. Sustained no damage. Lowest barometer reading 3:50 a. m., 740.40 millimeters.

As this reading is almost as low as the minimum at Hongkong, we may take it for granted that the center passed very close to the steamer at about 3:50 a. m. of the 18th. The distance from Pedra-Branca to Hongkong is about 70 miles. The steamer bound to Hongkong had probably traveled westward or west-southwestward since 1 a. m. and when the center met her she was probably some 10 or 20 miles west of the islet, or some 50 miles from Hongkong. The vortex would then have spent six hours to travel this distance, which gives a velocity of 8.3 miles per hour. The captain of the S. S. *Kneichow* further reports that from 4 to 5 p. m. of the 18th he stopped three times to rescue fishermen and families in vicinity of Ninepins, rescued 26 persons, and found the sea literally strewn with wreckage in every direction.

All these facts show how accurate was the warning sent out by the Zikawei Observatory on the morning of the 15th about this typhoon, as I intended to prove. Other warnings were given by the Zikawei Observatory, which will be seen in the following paragraphs of the letter above mentioned:—

> The direction of the center could not yet be surmised. The bulletin printed the following day, the 16th, noted that the movement was bringing the center toward the south end of Formosa. At the South Cape the north breeze had freshened to force 6, and a north gale, force 8, was setting in at the Pescadores. About noon a new signal was sent out telling that the cyclone was nearing the east shores of the island, with a slow motion.
>
> All the stations seem to have been too far from the central vortex to determine more accurately its direction, though it was clearly moving toward Formosa and China. In the afternoon we had to forecast rough weather in the channel, with strong north winds along the coast north of it, up to the Chusan.
>
> The worst of the cyclone was not in the center of the isobars, which are shown surrounding Formosa, on the Zikawei daily charts, but in the southernmost part, near the Bashi Channel.
>
> Two points seem quite clear: *First*, that the vortex, while advancing westward, was deepening more and more; indeed, though it did not pass so far from the South Cape as from the Pescadores, yet the fall of the glass at Hokoto (Pescadores) was heavier than at the other station (Koshun). The next day, still at Swatow, the minimum was lower, though at still greater distance. *Second*, that the storm which first traveled to WNW. (roughly) seems to have deflected little by little to W. or possibly WSW. as it approached the China coast. The reason may have been the high reading then prevailing in Siberia and Mongolia, which were progressively encroaching over the Yangstze Valley. From the 15th to the 16th the barometer had risen from 30.24 to 30.35 at Troizkossavsk (south of Lake Baikal).
>
> As a consequence, the pressure went up from the 16th to the 17th, from 29.76 to 30.04 at Shanghai, and to 30 at Hankow and Tchand. This served to make the gradient steeper and to increase the violence of the vortex.

ZIKAWEI WARNINGS.—A new confirmation of both the Zikawei warnings and the probable track of the typhoon we publish herewith may be found in a second letter published by the Zikawei Observatory. (Supplement to the Zikawei daily weather chart, No. 92.) The observations published in said letter give one more point of reference for the tracing of the trajectory, which lies about 80 miles WNW. of Santo Domingo.

> The United States auxiliary transport *Caesar* [says the letter] had left Cavite (Bay of Manila) for Shanghai on the 13th. The ship's barometer, a first-class one, was showing practically the same pressure as that of the standard of Manila Observatory.
>
> All went on smoothly until the evening of the 14th. At 10 p. m. a light NNE. breeze arose but soon abated, the sky became overcast and threatening. At midnight the wind again blew from NNE., then backed, slowly, to NW. at 3 a. m. (15th) and WNW. at 8 a. m. Afterwards the wind blew with short squalls, which gradually increased from force 2 to 4. At dawn a very distinct north swell was noted.

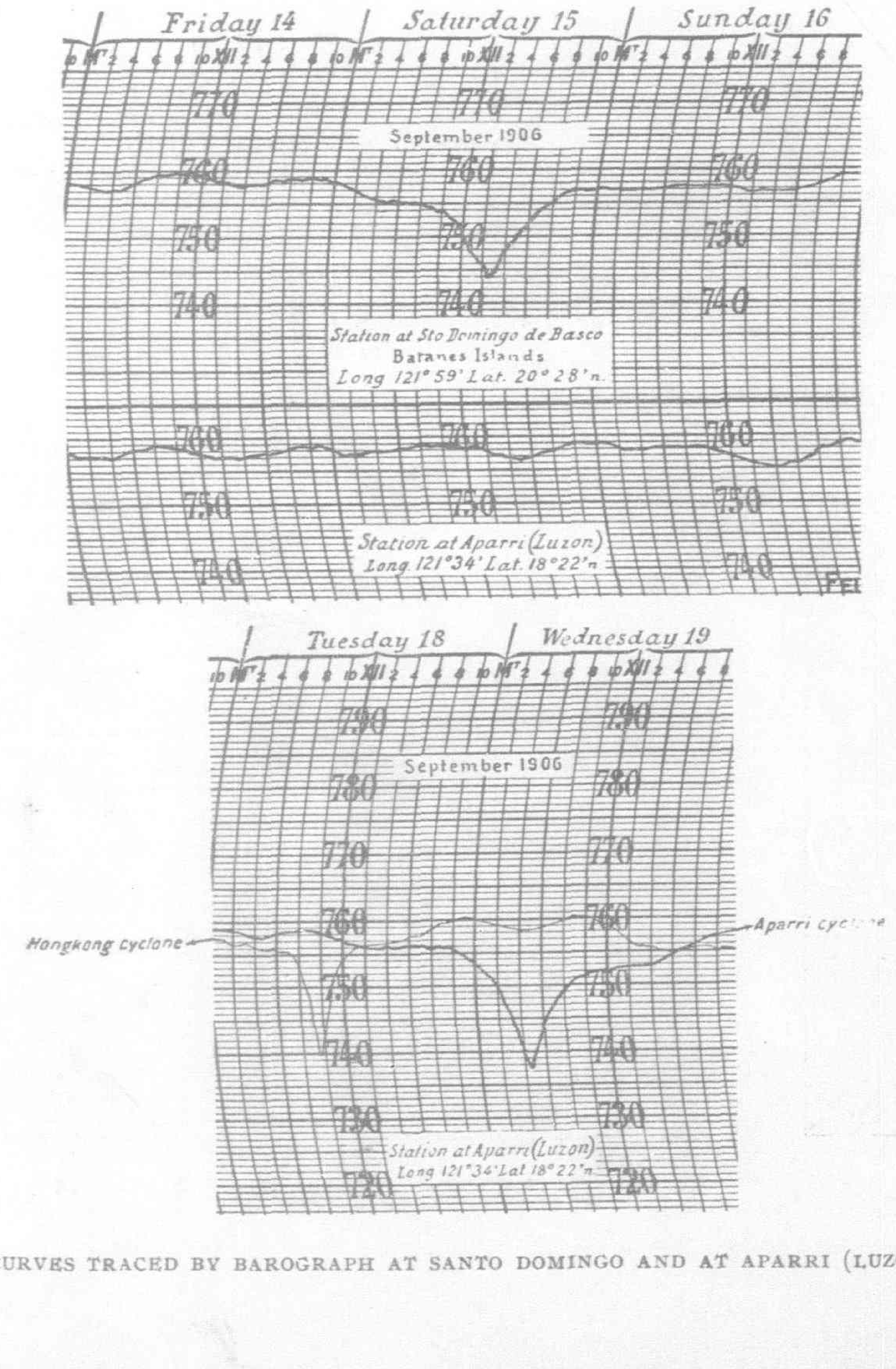
These two remarks we insist upon, for, slight as they were, they undoubtedly gave the earliest signs of the coming typhoon. This shows how long in advance a careful navigator can be put on his guard against an approaching danger. The report signals during the morning and a part of the afternoon, a sky heavily overcast to the eastward, bright and sunny over the west horizon—this was the typhoon bank or mantle well known to the naivgators.

On the 15th at noon the ship was found in latitude 19° 53′ N. and longitude 120° 20′ E., nearly 84 miles north of Cape Bojeador (Luzon). At 4 p. m. the wind was steady from northwest, freshened to force 7. The barometric tide could still be observed, but at 8 p. m. the mercury began to fall with oscillations estimated about 0.03; the wind freshened and veered to NNW. She was forced to steer southwest, to go away from the center.

At midnight she was 40 miles N. of her noon position, *viz.* 82 miles west of Batan Island. On the morning of the 17th a heavy west swell was observed along the shore of the South Cape of Formosa. The reporter says that the continuous rain which fell from the evening of the 15th to the 16th was the heaviest downpour he has experienced in his life.

The experience of the *Caesar* clearly shows that the center passed between that ship and the South Cape of Formosa on September 16th, shortly after 1 a. m.

(*Continued on page 199.*)

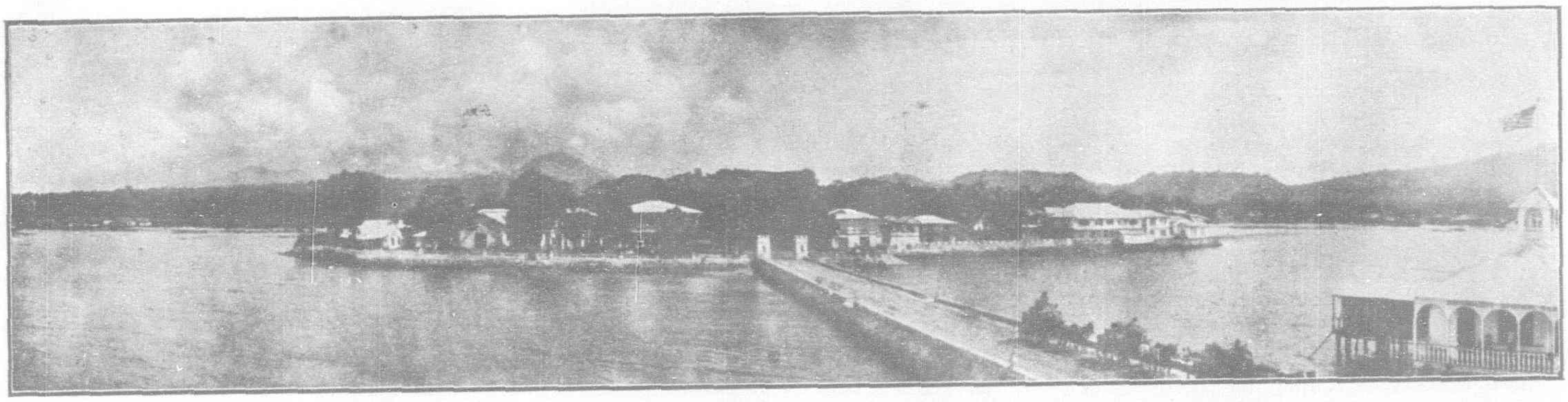


CURVES TRACED BY BAROGRAPH AT SANTO DOMINGO AND AT APARRI (LUZON)

PEARLING INDUSTRY IN THE SULU WATERS OF THE PHILIPPINES

The legislative council of the Moro Province, Philippine Islands, has passed an act amending the pearl-fishing law of the province, by striking out the clause requiring vessels engaged in the trade to be built in the United States or in the Philippines. As amended the section reads:

"No license to engage in the fishing for or the gathering of shells of marine *mollusca* * * * shall be issued to any vessel not wholly owned by citizens of the United States, honorably-discharged soldiers of the army or sailors of the navy of the United States; natives of the Philippine Islands, or persons who have, under and by virtue of the Treaty of Paris, acquired the political rights of natives of the Philippine Islands."

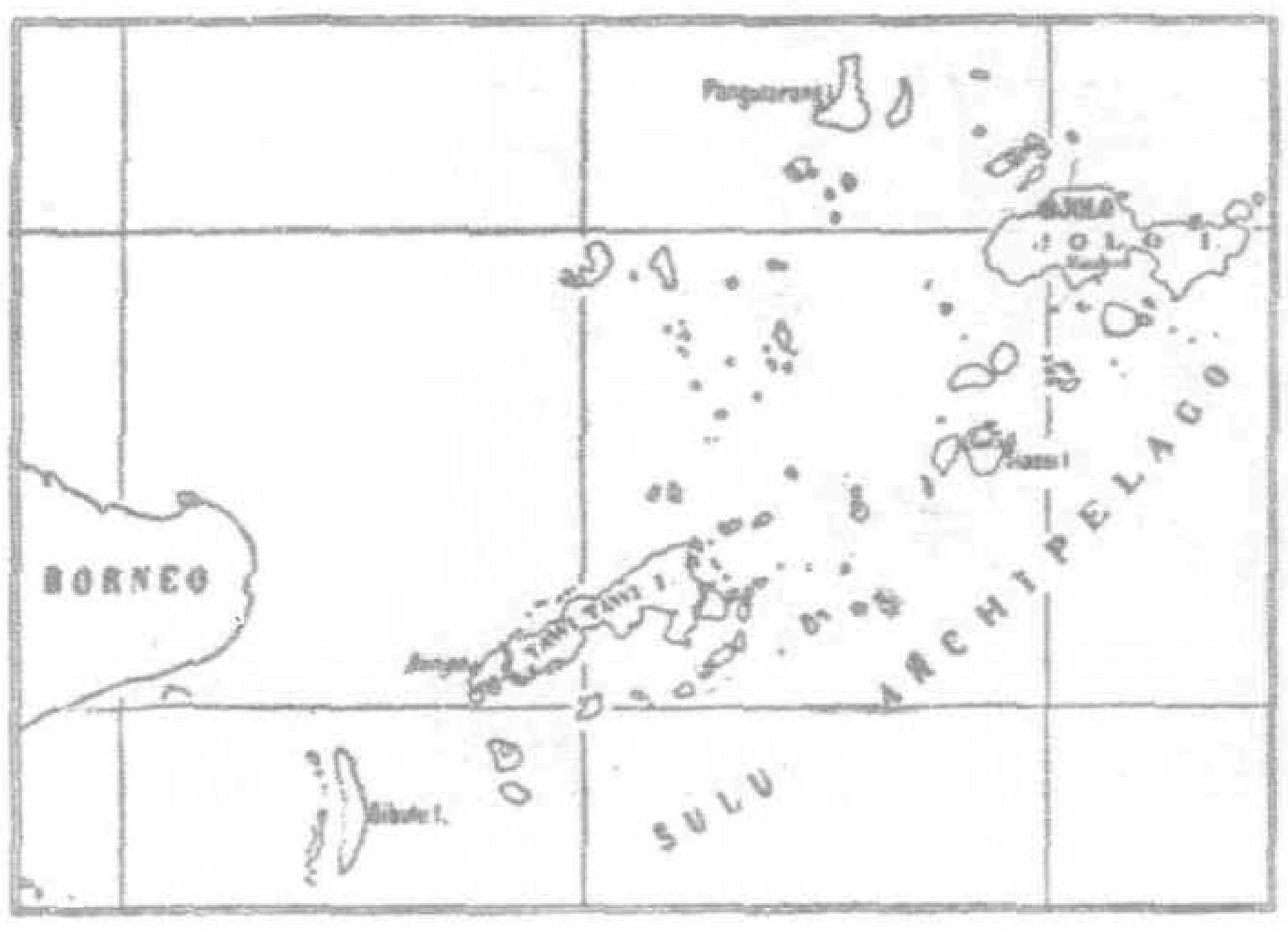


PICTURESQUE WALLED CITY OF JOLO, HEADQUARTERS OF THE SULU PEARLING INDUSTRY

SULU PEARL FISHERIES.—Fishing for mother-of-pearl shells and, incidentally, for pearls, is carried on to a considerable extent in the waters of the Sulu Archipelago, the town of Jolo being rated one of the foremost pearling ports of the world. The Chinese have large interests in the industry, and there are Americans, Spaniards, Filipinos, Ceylonese, Singalese and Arabs in it as well. All Moros are more or less interested, and a considerable percentage of the Sulu Archipelago actually gains a livelihood by engaging in this perilous business. It may be said that the entire population of Jolo dabbles in pearls. Curbstone traders are numerous, and they have to offer a tremendous variety of sizes and shapes, colors and varieties. The person who has the least instinct of the trader can not resist the temptation to buy and pit his judgment against that of the seller. The industry is said to be very profitable, and it is believed to be capable of great enlargement. The investment of comparatively small capital will, it is said, yield large returns under intelligent and businesslike management.

A MYSTERIOUS INDUSTRY.—Pearling is a mysterious industry. Thousands of lives are risked each year right here in the Sulu Archipelago, in delving into ocean depths for the great round-shell bivalve which occasionally contains a pearl with thousands. Because of the great risk involved, and the possible fortune to be gained, the industry has a fascination scarcely to be resisted by those who have once undertaken it. Because of the great variety of people who search for pearls, the vast area of the hunting-grounds, the centuries-old customs of the Moros, and the special laws covering the industry, no reliable figures can be obtained that will approximate the profits. The industry is therefore all the more mysterious.

Pearling is a game of hazard for high stakes. The pearler must risk his life, must brave the sea, and go prepared to fight for his rights, with savage men; and he must pay the taxes and divide the profits with the shrewd traders rom Ceylon and Singapore.



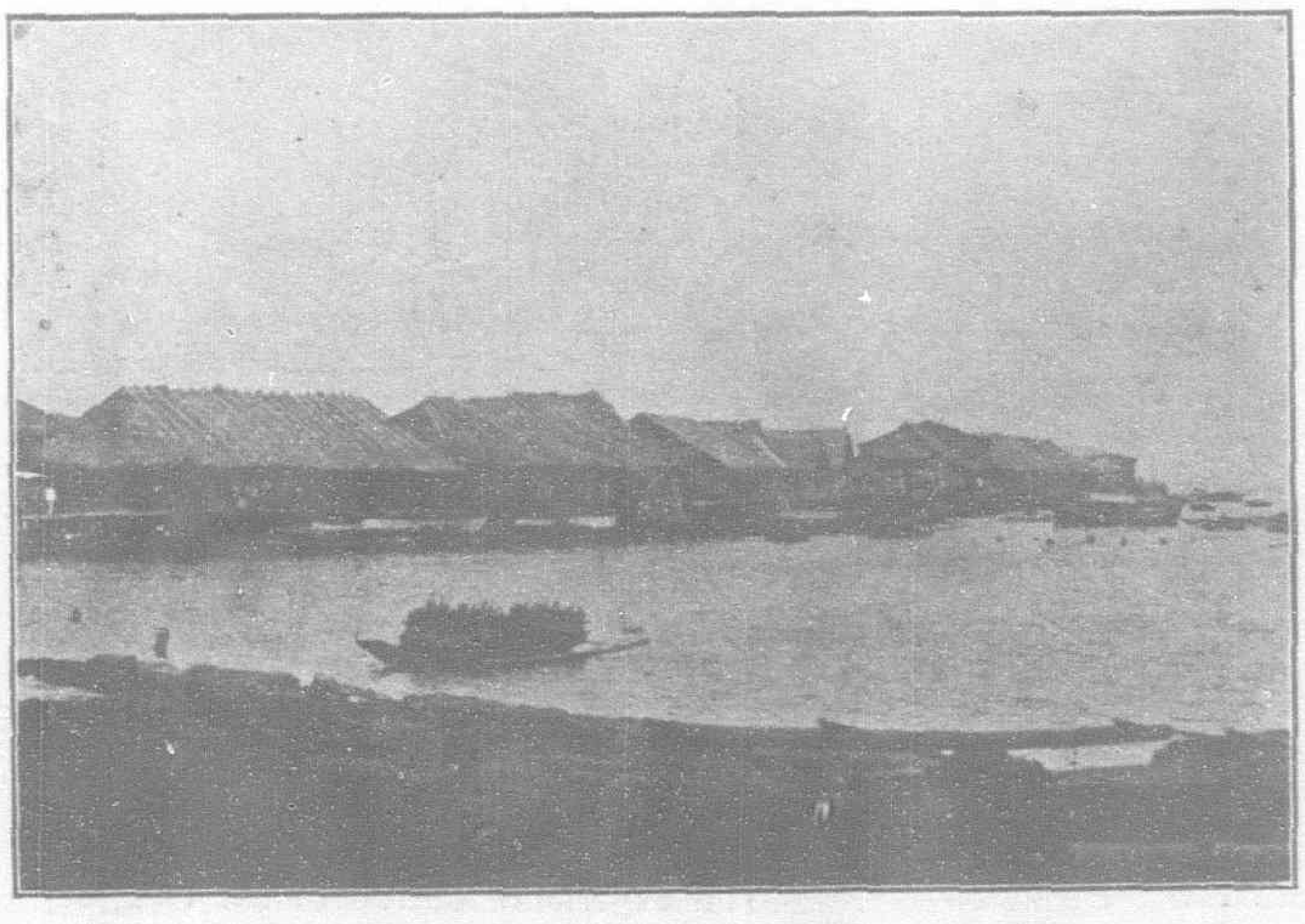
PEARLING GROUNDS IN THE SULU SEA

SOMETIMES FORTUNE SMILES.—Three years ago a single pearl was marketed in the Celebes for ₱36,000. It came from the Sulu Sea. During the following year a pearl brought to Jolo was sold in Singapore for ₱12,000, and last year one sold for ₱9,730. Such finds rarely come to public notice. Shrewd traders are always on hand to snatch them away from the ignorant diver, and the treasure is first exposed for sale on the open market in Paris or London or a Dutch port. Probably the dealer who places it on the market does not care to know its origin.

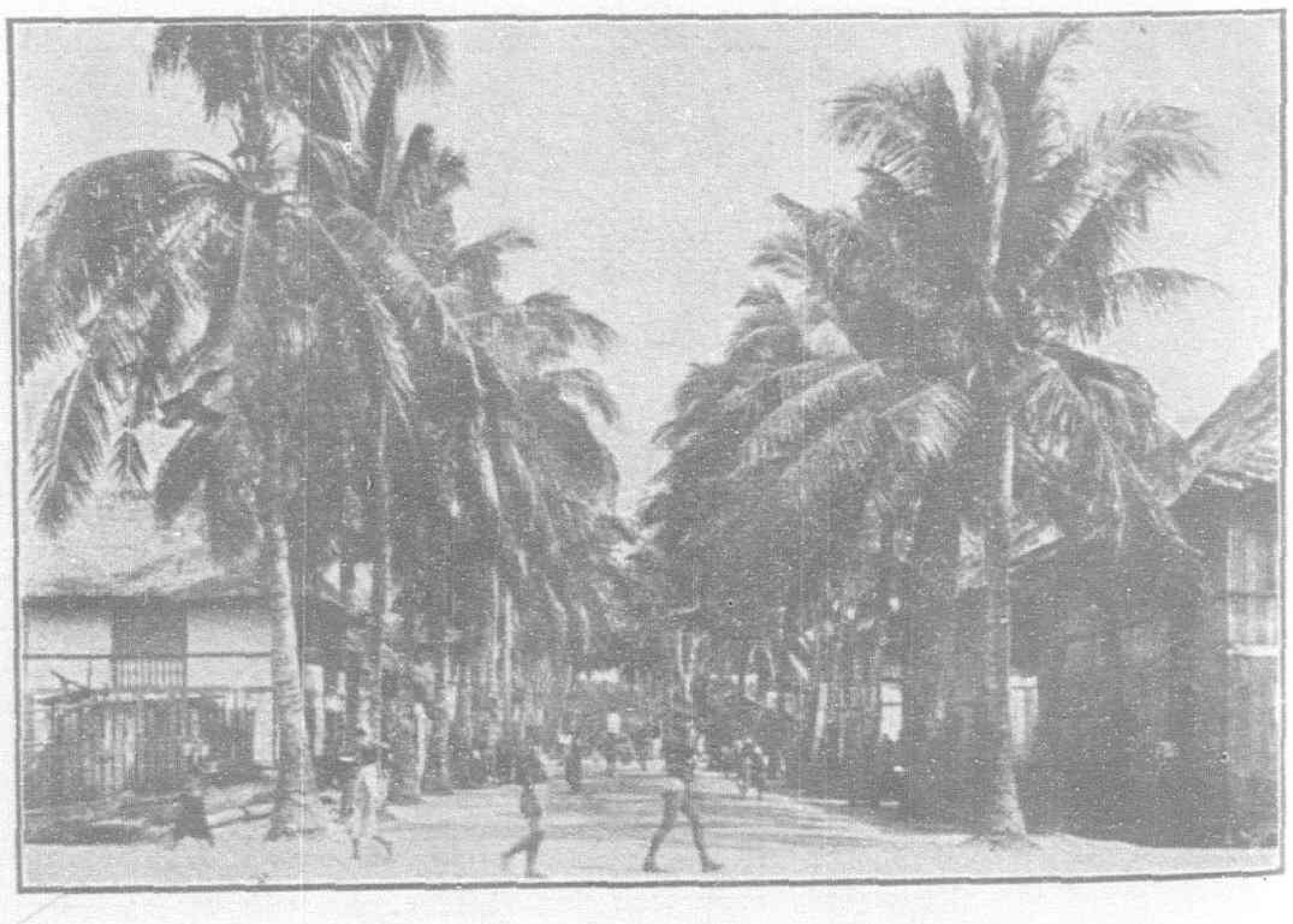
The greatest pearl ever claimed from the Sulu Sea, however, was recently marketed in Singapore for ₱60,000. It is the size of a marble, perfectly round and flawless, and of exquisite color. The gem was found by a poor Moro fisherman, seized by the Sultan of Sulu and marketed. The District Governor of Jolo learned of the transaction and saw that the fisherman received the justice due to him through court procedure. The sultan was compelled to disgorge the pearl, and then the District Governor commissioned the Jolo Trading Company to sell it for the benefit of the finder, which was done as above stated, the company receiving a commission of 10 per cent.

Thousands of pearls of less value are found every year, ranging in price from ₱0.50 to ₱3,000. Sometimes a rough-looking pearl, by the process of *skinning*, is reduced to a smaller and more perfect gem, and its value enhanced a hundred fold.

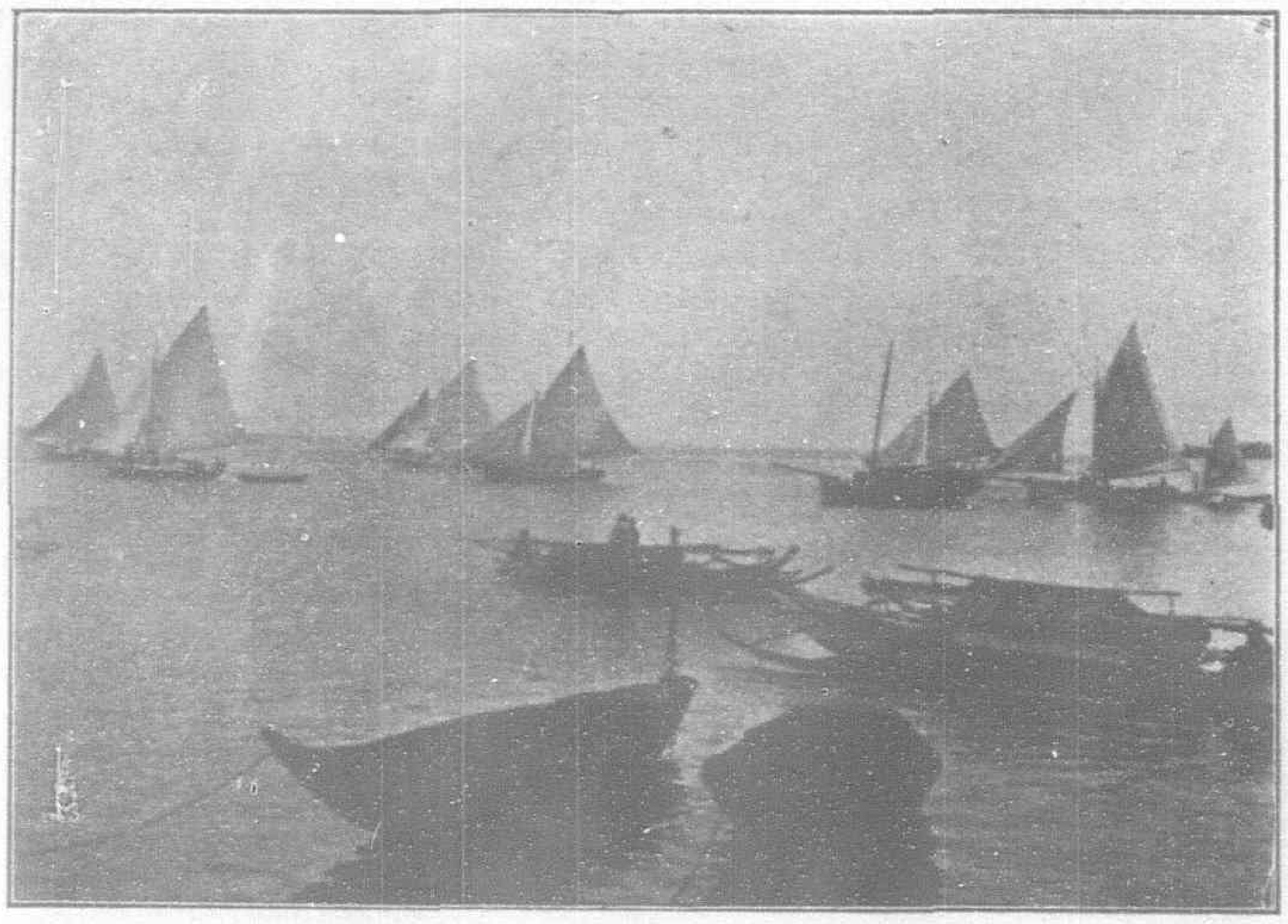
MOTHER-OF-PEARL.—Pearl shells are themselves very valuable in the markets of the world. These shells are plentiful in Sulu waters. At the present time the monthly shipment of mother-of-pearl from Jolo amounts to more than 600 piculs, valued in the local market at ₱80 per picul. As it does not take more than 30 to 35 pairs of shells to make a picul, a good *gathering* is very profitable. Manila is becoming a good market for mother-of-pearl, where there is now in operation a very profitabe factory for the manufacture of buttons, knife-handles, etc., and mother-of-pearl novelties of every description. Singapore is also a good market. A large pair of shells will weigh 10 to



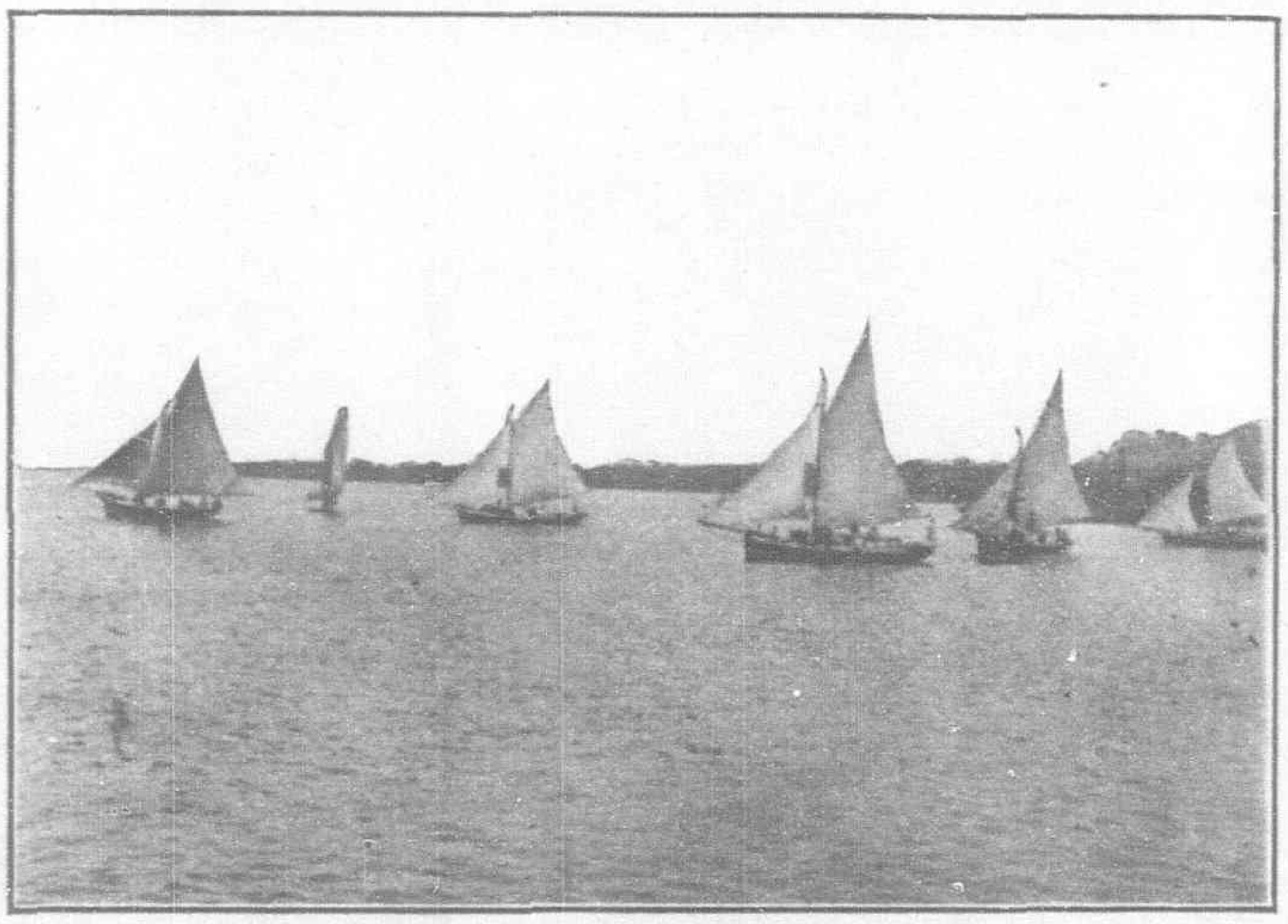
MOTHER-OF-PEARL MARKET AT JOLO



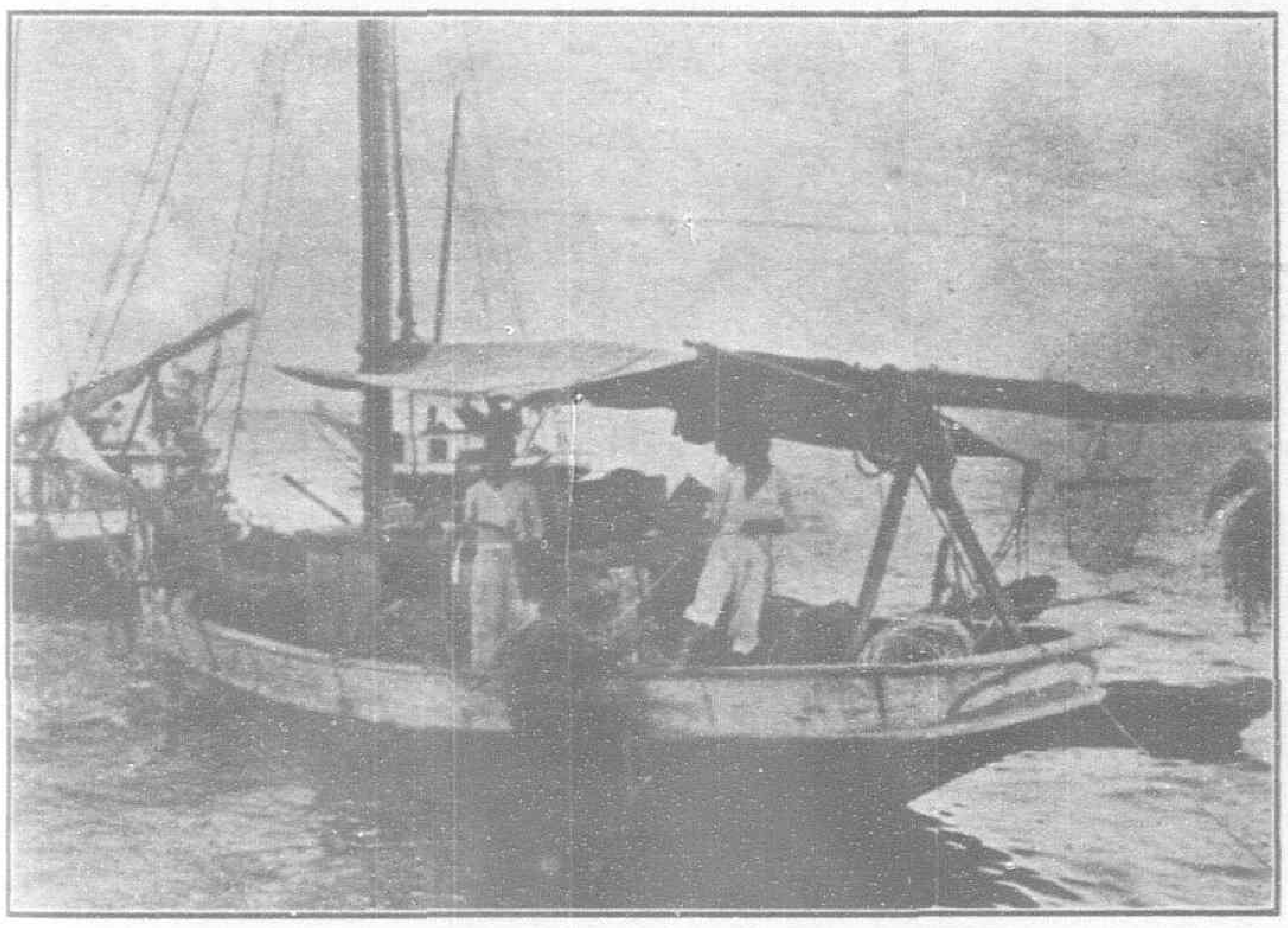
STREET WHERE PEARL BROKERS OPERATE



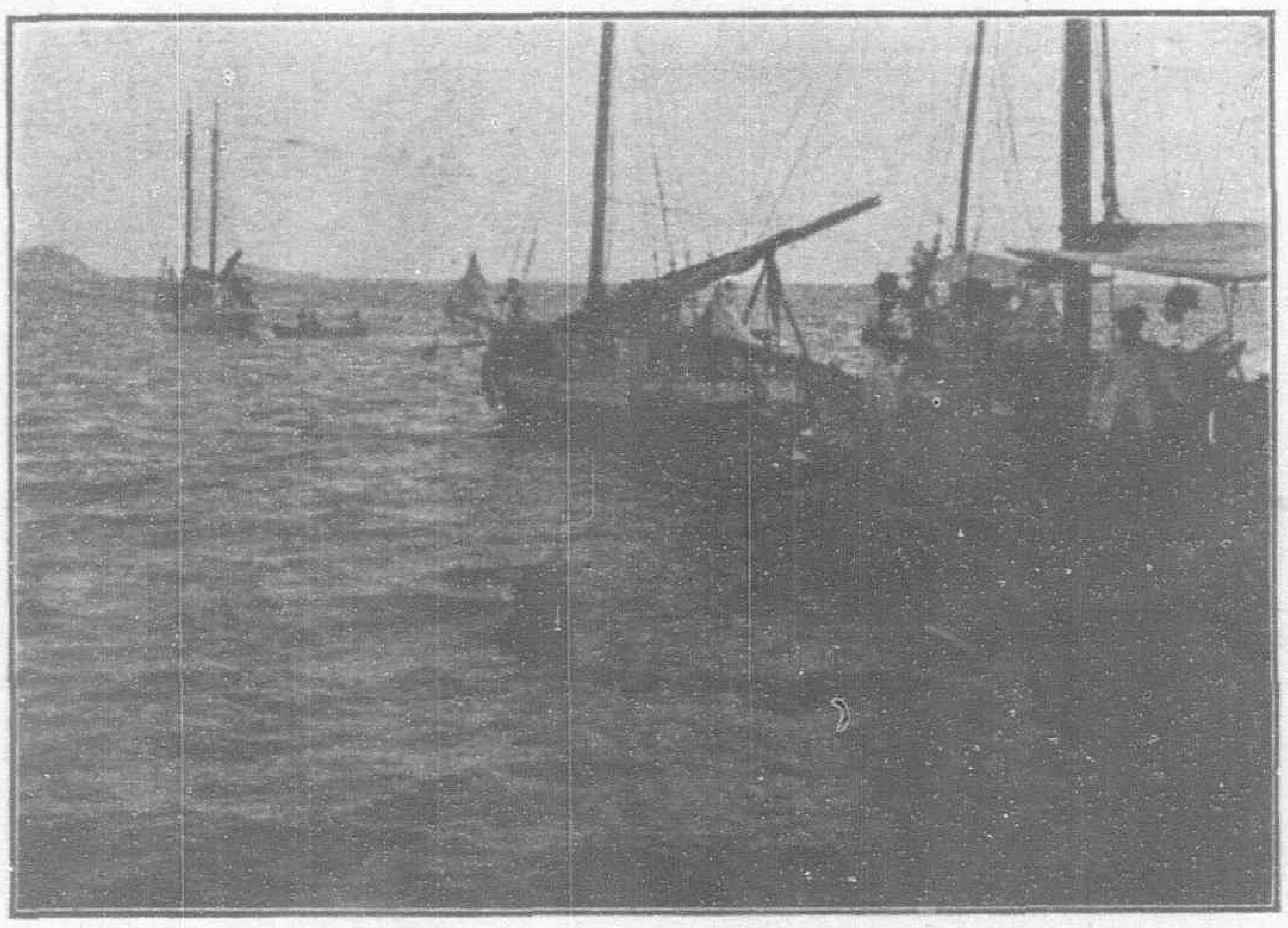
PEARLING FLEET CLEARING ANCHORAGE AT JOLO



FLEET AT THE PEARLING GROUNDS



DEEP-WATER DIVER GOING DOWN INTO THE WATER AFTER SHELLS



DIVER COMING UP OUT OF THE WATER

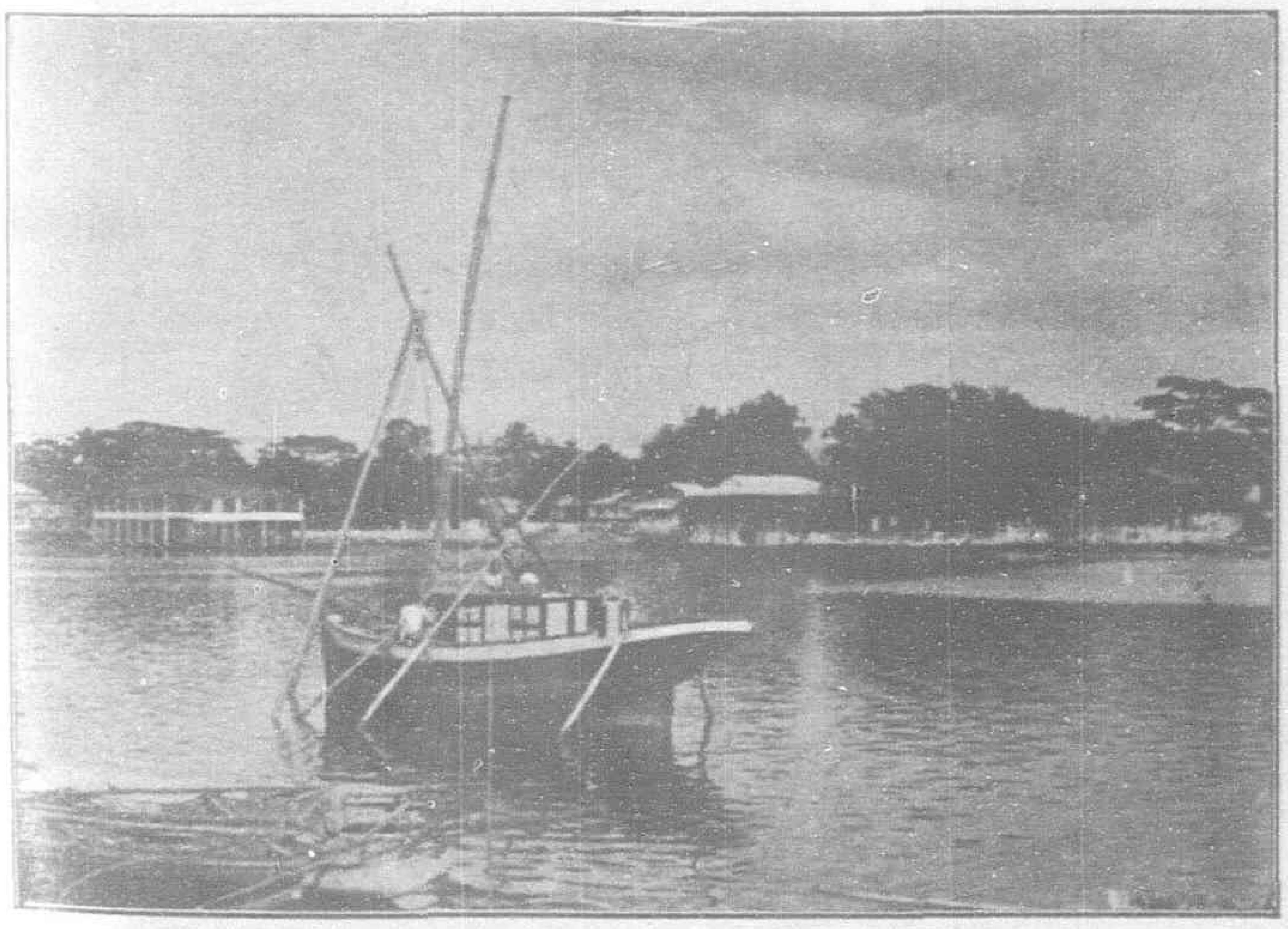
12 lbs. The finding of pearls is merely incidental to the larger industry.

METHODS OF FISHING.—In fishing for mother-of-pearl shells down in Sulu waters the months of April, May and June, and November, December and January are the most favorable, and practically none is done in any other period of the year. These seasons are determined by the character of the winds, the calm weather being an essential to success. Pearls are found mostly in water about 50 fathoms deep. At the present it is estimated that more than 2,000 boats have been equipped and made ready for the beginning of the fall fishing which will be inaugurated before November 5th.

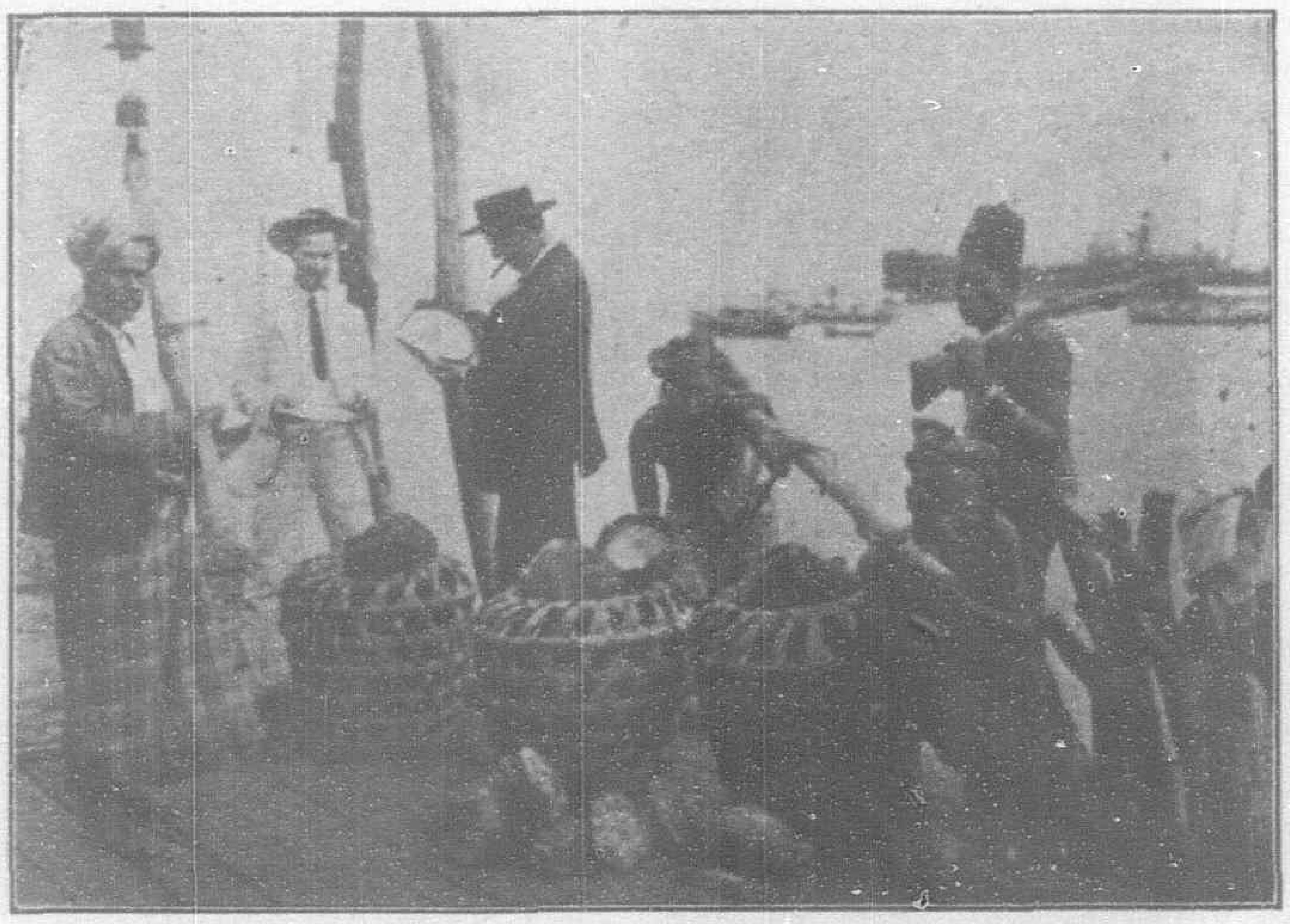
The apparatus used for shallow-water dregging consists of a rake, the teeth of which are very long, thick and curved; the handle being comparatively short. The whole apparatus distinctly resembles a cradle, such as was used in the United States for cutting grain 30 to 40 years ago, and if suspended by the end of the handle will take a horizontal position. To the end of the handle is attached a piece of *bejuco* (rattan) about ½ to ¾″ thick. At the head of the handle is attached another piece of rattan about half as thick as that at the other end. In length each piece of rattan is about 1½ times the depth of the water in which they fish.

One of these apparatus is dropped overboard and the boats are paddled with the tide. When it is felt that the rake is full, it is lighted by means of the thick length of the rattan, and the contents emptied into the boat. Should the

(Continued on page 202.)



PEARLING BALANDRA, OR SLOOP

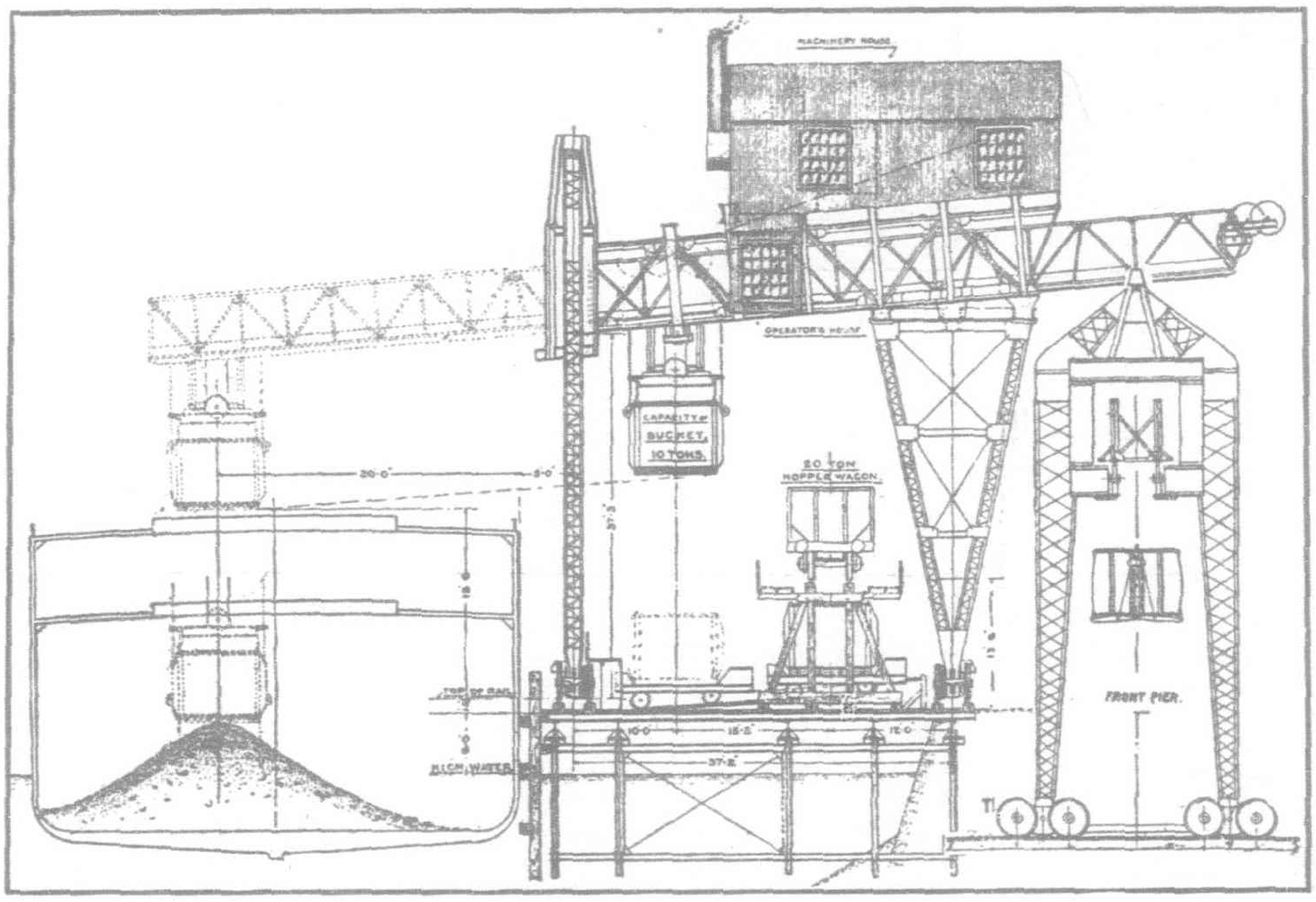


ARAB MERCHANT LANDING PEARL SHELLS AT THE MARKET

COAL-CONVEYING PLANT, JAPAN

The Brown Hoist Company of Cleveland, U. S. A., has recently installed one of its patent coal-conveying plants for the sea-borne trade at the Japanese port of Wakamatsu, for the Kiushiu Railway. It comprises two hoisting and conveying machines, each 37′2″ span, with telescopic extension arm at the front pier, or vessel end, of 43′6″. The machines are constructed almost entirely of iron and steel.

Each double-cylinder hoisting engine travels its machine on its tracks upon the dock, when in ordinary use, at from 400 to 600′ per minute, and will hoist the 10-ton load in the tub at the rate of about 150′ per minute. The motion of the tub, or ram, out over the vessel, which works by gravity in that direction, is from 300 to 600′ per minute. The lowering of the load over the vessel is by gravity, and is controlled by a brake and foot lever. Returning the tub with ram, back to the place of starting, is from 300 to 600′ per minute.



COAL-CONVEYING PLANT AT PORT OF WAKAMATSU

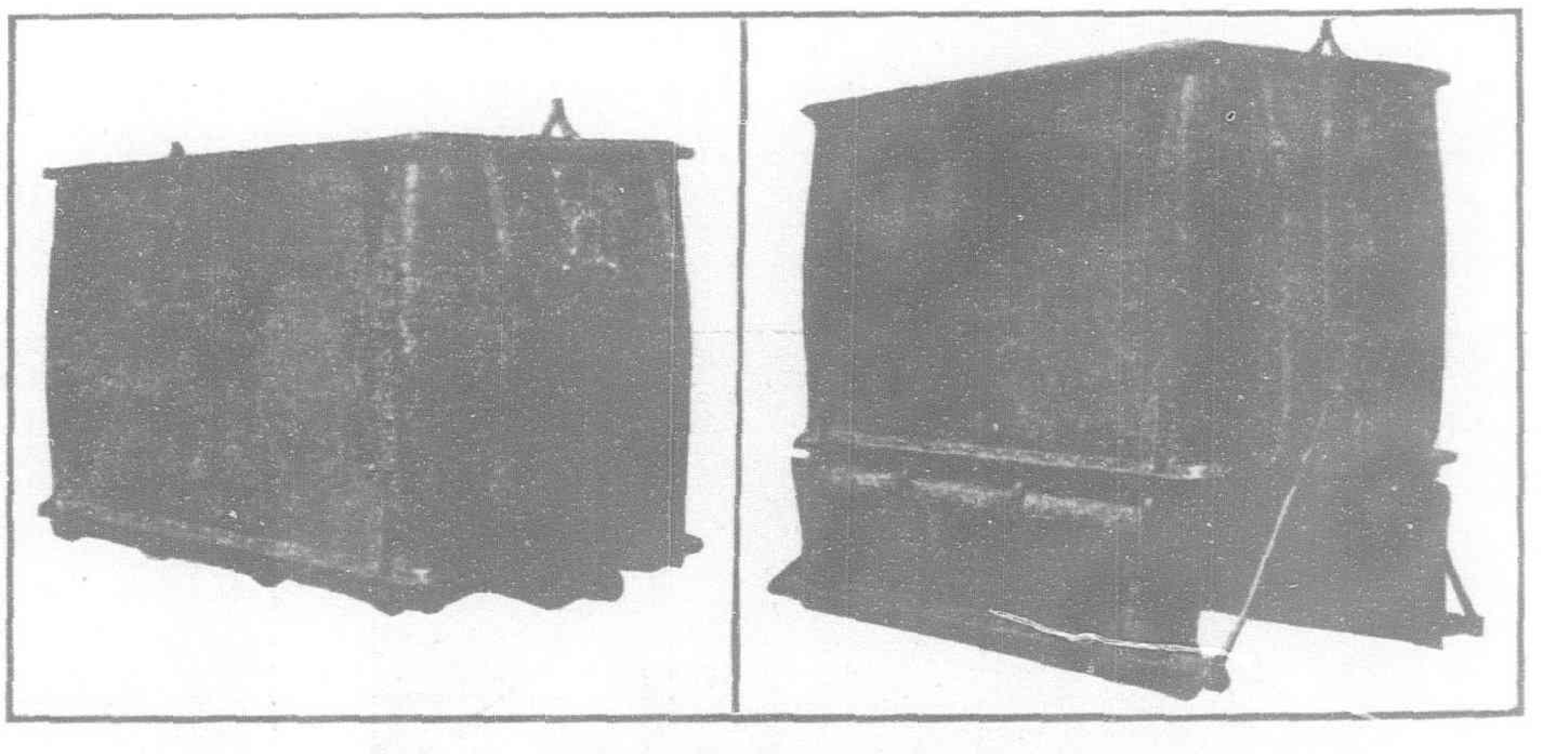
Both machines have a built-up lattice girder bridge, supported at either end by the front and rear piers, this bridge having to support the extension arm. Each of the machines is supported at the front end on a single pier or shear, and at the rear end similarly. The front pier is of sufficient height that the bottom of the bucket at the center of the shear rail is 21′ above rail-level. Both piers are constructed of iron and steel, and the whole is mounted on four equalizing trucks with suitable and convenient gears to move them along the rails and tracks on which they are mounted.

Each machine is provided with a telescopic extension ram, so arranged that it can be moved out over the vessel by gravity and returned back to the place of starting, by steam power. The moving gear from the front and back piers is arranged to be operated by steam power. All wheel axlebearings are bronze bushed, and are provided with convenient oil chambers with lids.

Two hoisting engines are in the equipment, each with two cylinders 13″ diameter, 15″ stroke, mounted on the same bed with patent band friction hoisting drums and band friction pulling drums for the ram and conveying machine. Each is also equipped with band friction clutch gearing which, through its shaft and gear, connects to the truck wheels on which the whole machine is mounted, and propels the whole structure along the tracks, the drums being of sufficient face for the grooves on same to hold the rope required for operating the machines without overwinding.

Two special cylinders are provided, so constructed and connected to operating ropes that the special coal tube may be emptied at any time and in any position. Two special locomotive-type horizontal boilers, of ample capacity for the maximum work they are to do, are also installed. Two special pumps are mounted in the lower part of the back piers for the purpose of pumping water from a water-tank car, and filling the special tank mounted on the back piers, for feeding the boilers.

Twelve special automatic coal tubs, made of iron and steel, have been supplied, with inside dimensions approximately 8′ long by 6′ 6″ high, by 8′ wide, equivalent to a capacity of about 10 gross tons of coal when completely filled. Each tub is equipped with its operating doors and carrying loops, safety guards, and is bound around the top and bottom by a stiff steel beam or rail, with the sides arranged in the curve to throw them in tension and prevent buckling and getting out of their normal shape. The ends are flanged at their sides to a round edge, to which the side plates are riveted, and these ends are stiffened by Z-bars and guards.



TEN-TON COAL-CONVEYING BUCKET, CLOSED AND OPEN

For operating on the gravity track twelve tub-handling cars are provided. The cars are built entirely of iron and steel except the footway on which the man stands to hook on the tub, and the floor on top of the steel frame of the car on which the tub rests, which is also of wood.

MORO PROVINCE OF THE PHILIPPINES

In a recent issue of *The Sun* (New York), appears the following contribution from the pen of Mr. W. J. Ballard, of Los Angeles, Cal., one of the best known newspaper correspondents in the United States:—

From THE FAR EASTERN REVIEW of Manila, we learn that the American occupation and government of Moro Province, Island of Mindanao, Philippine Islands, is producing good results. For centuries the Moros have been a people apart unto themselves in race and customs.

The policy of the American administration of the island has been to aid, to the extent of its power, the development of agriculture, commerce, fisheries and the timber industry; to furnish cheap transportation to producers, and to give equal opportunities to all, regardless of color or position in life. When the Americans took hold of Moro Province two years ago, slave raiding was rampant, and every form of lawlessness and outlawry existed, especially in the Island of Jolo, in the upper reaches of the Cotabato Valley, and in the country about Lake Lanao. Many Christian Filipinos had been carried into slavery, their settlements and *rancherias* captured and ransacked and their women carried off.

After two years of active operations against the fighting Moros, the authority of the United States Government has been recognized, and for the first time in their history the Moros are paying taxes to a Government outside of their own tribal relations. The people are handled (as in India) through their native chiefs, who in turn have native deputies. The head men report to the District Governor. Special agents of the five District Governors are placed among the wild people, to gain their confidence and good will, to teach them how to trade, and the value of observing law and order.

To encourage trade, exchanges or trade stations have been established at the instance of Captain John F. Finley, United States Army, Governor of Zamboanga. To these stations Moros and other non-Christians bring their products and secure ready sales for them. People are coming in to trade who never before saw men meet without fighting, and who never saw the seacoast. The Moros prohibited until recently any fishing or seacoast traffic by the inland natives. They held it all for themselves, and lived on the profits of the labor of other tribes. That is chiefly the reason why they resisted American occupation and the opening of the country to the death Inland natives now come and go as they please, buy and sell as they please, getting and paying the current prices in open market.

The Mohammedan religion has not been interfered with, nor any too drastic reforms established, except in the suppression of slavery, human sacrifice and the autocratic powers of the datus.

Public schools have been established in all the principal towns; some American teachers have been employed, and many native assistants. The schools are well attended, and the children are making good progress. Children of many tribes, speaking different languages, are now started on the road toward learning English. For the Moro children text books written in Arabic and English characters had to be prepared. Native teachers are learning English at a normal school in Zamboanga. In the same city there is also an industrial school for Moros and Filipinos.

Public works in Mindanao have been limited only by the funds available. Wharves and landing places, passable roads and trails and many bridges have been built; also many schoolhouses, as well as district and provincial offices. In Zamboanga a provincial building of concrete and native hard woods is under construction; it will be the best and most permanent type of building put up in the islands since American occupation began. The Moro Province is solvent, though its revenue is small.

The enormous Island of Mindanao is practically covered with forests of valuable woods. Its undeveloped wealth is very great; especially in timber and jungle products, such as crude gutta percha rubber, cinnamon and allspice. Many rubber plantations are being started. Through the south and east coasts of the province large amounts of hemp are being cultivated. The product is of excellent quality and the crop large. Cacao (cocoa) also does very well, and is quite a profitable cropto handle.

The success of the cocoanut industry in Mindanao is well known. It is one of the principal sources of revenue of the province. Planters are putting in a great many cocoanut trees everywhere. Rice and other native food products thrive generally in all sections of the province.

Coal is present in many places, but cannot yet be profitably worked. There is an unlimited number of mango trees, which have a bark most valuable for tanning and dyeing. This industry, so profitable in the Malay Peninsula and parts of Borneo, is as yet entirely undeveloped in Mindanao. The sea swarms with many kinds of valuable fish, and the pearl fisheries of the Sulu Sea are extensive and profitable. The Moro had this industry corralled but it is now open to all who comply with the legal requirements. Sugar grows well, and large areas are especially adapted to its growth. The Cotabato Valley is preëminently so. Philippine sugar should come into the United States free, and the American money go into American owned sugar mills over there, fitted with American made machinery and directed by American executives. The present situation is all wrong.

Coffee of good quality, about 100 tons a year, is produced in the small section around Lake Lanao. To get cheap and regular freights the province of Moro has subsidized one steamer ("the children are wiser than the fathers, etc.") and will probably subsidize another, with a fixed agreement as to rates of freight and passage.

The Moro is a ready worker, anxious always to make money, and strong and energetic. He is perhaps the best laborer found in the Philippines. The climate is healthy, and suitable to white people.

The Far Eastern Review closes by saying: "In comparison with other countries in the Far East, it is believed that the Philippines, and especially the southern Philippines, as represented by the Moro Province, offer the best field for white settlers at present in the East. The general policy of the Government of Moro Province (as of all the Philippine provinces) is to give all its people security of life and property, its children an opportunity to obtain an average education, and to all its people regardless of color an opportunity to succeed in accordance with their ability."

BRIGHT GOLD-MINING PROSPECTS IN THE PROVINCE OF BENGUET, P. I.

(Concluded from page 191.)

that the lay of the country is such that all lodes and ledges may be tunneled, doing away with the expensive shaft, and that in consequence the drainage will be perfect and not the expensive annoyance so almost universally found in these ventures. The tunneling under his charge and direction has reached 220′.

In this same district along the Antimok River is located the Bua Mining Company. This company is organized with Manila capital on a basis of ₱200,000, though with almost unlimited backing. This corporation has possession of 20 claims in which it has already constructed between 2,000 and 3,000′ of tunnel and shaft. In its work it has developed eight paying loads assaying from $6 to $40 to the ton and finding intervening streaks of high grade ore. This company's plans for the coming year contemplate the construction of a large milling plant, as it is thoroughly convinced of the richness of its prospects.

On these claims are clear indications of past native work showing by the Igorot tunnels that gold was taken from here under the Spanish Government, probably a century ago. Throughout this region and in fact throughout the entire province sufficient water for milling power is readily found.

Also in this same district and on the same river are the pioneer miners, Clyde and Peterson. I may say these are also among the pioneer *prospectors* of this country, but I speak of them as pioneer miners because they are the first who with machinery extracted gold from the dirt of Benguet. These men made their own mill with its stamp, and with their own hands put it together again every time it would fall apart. It was a crude, flimsy piece of machinery with amalgamating plate so small that it would ordinarily be considered impracticable. Yet with their indomitable energy and perseverance these men worked about 300 tons of ore through this little mill extracting about $5 a ton and saving perhaps 60 per cent of the gold in the ore, the remaining 50 per cent being left on the dump. I am not endeavoring to promote the mill as constructed by Peterson and Clyde, but state these particulars as proof of the richness of their claims, when with such crude machinery they can accomplish so much.

Opposite this valley but within two miles of these workings is the mine of Mr. James Kelly. This prospect carries with it, as shown by its assays in the lode in which he has most developed both copper and gold averaging between $18 and $20 to the ton, although he is developing another lode on the same claim that has no indication of any other mineral than gold therein. He has between 700 and 800′ of underground work done and finds the richest ore so far about 200′ below the surface, all being graded tunnel work.

On the old Benguet-rd, perhaps five miles in an air line from the Kelly workings, is the Copper King Mine, George A. Mead principal. The assays from this mine show gold, silver, copper and lead, with an average value of $20 per ton, although herein have been found small seams running into such enormous assays, that it is best they should not be quoted. Rich in quality but small in quantity. They are now putting in a 3-stamp mill with a capacity of five tons a day. Throughout the district included by the Copper King there is fully 1,000′ of underground work accomplished. There is no company connected with this mine, it being developed by the prospectors who first discovered it.

I have thus enlarged upon our natural resources in mineral, because after nearly five years residence among these people and in charge of this province, I am becoming entirely convinced that there is an astonishing source of wealth awaiting our Government through the yellow metal that will be taken from the mountains of Benguet. To the investor I do not think this will be in any sense an experiment, but absolute certainty for returns and generous returns at that. All these features which combine to make mining practicable are now to be found here. The timber necessary for the tunnel work grows on every claim. It is ample and easily obtained. Our forests are of pine found in three different varieties, growing, large, straight and in most mining localities to the height of one hundred feet. From these forests and under the provisions of the Forestry Act, the Benguet Commercial Company with one sawmill is producing the timber necessary for the construction of houses, public buildings and bridges.

PROBABLE ORIGIN AND COURSE OF THE HONGKONG TYPHOON

(Concluded from page 195.)

Another not less important document is the report of Capt. T. D. Andrews, R. N. R., commanding the P. and O. steamer *Delhi*, which was just entering the passes of Hongkong with the London mails when the typhoon burst upon the colony. One thing only was left out of the captain's report, which we must mention—the clear-sighted and unerring way in which he saw the coming danger. We know from a note of the passengers that long before the very first squall all was tied up and ready on deck to weather the hurricane. Now, of course, since leaving Singapore, Captain Andrews had received no signal of any kind. The report simply says: "September 18th, 4 a. m.: Wet sunrise, hard clouds, greenish sky, northeast swell; short intervals." He was then to the south of Gap Rock, where the swell must also have been felt, even probably on the 17th in the afternoon. The lighthouse was reached at 7:46 a. m. The preceding day's report calls for but one remark; on the 17th, at noon, a distinct ENE. swell was noted, the wind blowing south, force 2. She was then by 17° 58′ N. and 111° 35′ E.—that is, about 420 miles from the vortex that was rushing toward Hongkong. It is not until the next day—18th, 4 a. m.—that the breeze veered to W. with occasional squalls. The *Delhi* dropped anchor not far from Green Island, when the wind freshened to hurricane force and the rain fell with blinding violence. The center passed to the north of the *Delhi* between 9:45 and 10 a. m.

The velocity, checked by the struggle against the very high pressures of the north, went increasing, as the center was coming nearer to the coast; the track was approximately WNW. or W. by N.; the swell was noticed at 420 miles' distance on the China Sea.

CONCLUSIONS.—Whereas the ratio of the fall of the barometer was less on board the ship *Caesar* (which may be ascribed partly to the ship's movement) than at Santo Domingo, and the minimum reading at this station lower than on board the ship, we may conclude that the center passed at a greater distance north of the ship than of Santo Domingo. The veering of the wind on the *Caesar* is very similar to that of Santo Domingo. This shows that the center had retained its direction since it passed over Santo Domingo. By assuming that the center was at its shortest distance from the ship at 2 p. m. of the 16th, and that the length of the track from Santo Domingo to the point of least distance may be estimated at 80 miles, according to the circumstances of the ship's position and movement, we may further conclude that the velocity of translation of the storm was again about 8 miles per hour. Finally, the observations on board the *Caesar* show also that the storm increased in violence since it left Santo Domingo.

The fall of the barometer from 9:30 a. m. to 10:45 a. m. on board the S. S. *Delhi* is very remarkable and a record by itself—seven millimeters in fifteen minutes. This may explain the extreme violence of the wind in Hongkong

There is a very striking resemblance between the barograms of the Hongkong cyclone and that of the Aparri cyclone, which we publish side by side. The latter storm, which was felt in Guam on the 10th, destroyed the northern part of Cagayan Valley some 20 hours after the former reached Hongkong. This is the storm which passed through the south of Hongkong at about 6 a. m. of the 20th and which we reported to that colony on the 18th at 3:45 p. m.: "Typhoon out in the Pacific ENE. of Manila, moving probably to WNW.;" and on the 19th at 10 a. m.: "The cyclone has crossed Luzon near parallel 17°, direction given."

As regards Hongkong, the particulars of the catastrophe are too well known to be detailed here. I shall end this short account of facts by stating that it has been a very serious drawbark not to be in telegraphic communication with Batanes Islands, there being no cable to Santo Domingo; as we could otherwise send to the neighboring observatories very precise information 48 hours before the disaster.

MANCAYAN-SUYOC MINES AND ABRA RIVER PLACERS, LEPANTO-BONTOC PROVINCE, LUZON

(Preliminary Examination by LEONARD LEHLBACH, M. E., Manager Lepanto Mining Company, Inc.)

(Concluded from October.)

The Spanish workings, which present the only semblance of a mine, are at Mancayan on the Lepanto and Bontoc claims. Here some 6,000′ of regular and irregular galleries and winzes have blocked out a large body of ore which a thorough examination alone can safely put into reliable figures. The result of 36 yrs. of Spanish smelting with a crude Mexican smelter is seen by a waste or dump heap of some 100,000 tons of ore worth fully $2,000,000. I believe it safe to predict that a thorough examination will prove the existence of at least 70,000 tons of $30 ore and likely as much as 150,000 tons of a lower but pay grade in sight. It is, however, unwise to speculate on the future possibilities of this ore shoot until after a thorough examination has been made. The present development proves the existence of a shoot or chimney some 1350 long by 200′ in width in which are repeated occurrences of lenticular masses of high grade copper ores. It would appear from the character of the occurrences that there is little likelihood of the shoot continuing much further N. but that it will become stronger to the S. in the Keystone claim. My examination being only a preliminary one does not place me in a position to give accurately the quantity and grade of the ore contained in this shoot.

The high grade Mancayan ores range in value from 6 per cent copper and $2 gold to 30 per cent copper and $5 gold per ton, with a small silver content. The low grade ores from 2 per cent copper to 5 per cent and from $2 to $5 gold per ton. There exists here also a large but undeveloped body of pyrite in a calcareous quartz gangue which carries some $5 and higher in gold per ton.

The native workings of Palidan, Gatugat, Cayan and Gobossen give values varying greatly and worth from 3 per cent copper to 12 per cent copper, a low grade of lead and zinc ore, and from a few dollars to $500 in gold per ton. The higher gold values being found only in small pockets or veinlets.

The Quien Sabe vein gives some $5 gold over 6′ width of calcareous quartz vein which is traceable on the surface and through native, Spanish and American drifts for several thousand feet, its brecciated hanger, over 4′ or so of width, gives a medium copper value.

The Laura claim in the quartz porphyry dike shows high grade copper values but has not been sufficiently developed to enable a safe estimate being made.

Spread out all over Suyoc, E. of the quartz porphyry dike, are numerous small veins giving high gold assays. They have not the appearance of strength and are practically undeveloped. It would answer no useful purpose to give their values.

The ore occurrence on the Anaconda and Elizabeth claims, cut by the Copper Queen Creak and opened up by tunnels, gives an average value of $54 per ton gold, silver and copper; many of the assays running exceedingly high in silver are not included in this average.

Treatment.—For a description of the earliest method of treatment I quote from the report of Sr. D. Antonio Hernandez, taking the liberty of shortening somewhat his account:—"The mineral after being extracted from the mine is submitted first to a roasting or crude melting; for this the natives open in the ground a small hole which they cover with thin sticks forming a gridiron, above which they place a small, compact heap of mineral, held down by a board or piece of tree, covering all with thin pine wood, they leave a protected hollow above the board. They ignite this at once, leaving it alone until it has consumed the wood and completely heated the sulphur of the mineral, which takes 2 or 3 hrs. The products are an impure mass of copper mixed with earthen substances and pieces of coal and scorias of quartz which offer the aspect of a breccia in which the cement has partly disappeared, converting it into a porous mass. The copper matte then suffers a melting process for black copper, which they execute in the following manner:—They make a hole six or eight fingers in diameter which they surround with stones forming a species of hearth or crucible, leaving an open space for the placing of a pipe connecting with a cylinder bellows. This consists of two cylinders made from a hollowed trunk of pine in which run pistons formed by blocks of wood dressed on their circumferences with dry herbs and chicken feathers, which are held down only by the bellows so they work in the manner of springs against the interior surface of the cylinders. In the lower part there is a hole in which they place a cane, closing the valve at the beginning of the stroke. Having formed the oven in this manner they charge it with pine fuel, mixed copper and matte, and put the bellows in motion, taking care to add fuel in proportion to its consumption, and to agitate little by little with a cane so the copper may fall to the bottom, and become cleaned from the foreign substances with which it may be mixed. When they know that the copper has all united into one mass, which should take place after 10 or 15 mins. they stop the bellows, and take out the coal and scorias that overfloat the metallic bath, leaving it uncovered until it has hardened a little and acquired sufficient consistency to permit of handling. The product is a cake of black copper, of rough and broken surface, full of earth and pieces of fuel. This cake is placed at once on a bonfire where it is left 2 or 3 hrs. making it suffer a kind of roasting process which purifies it somewhat, it being afterwards melted in the same furnace placed in a species of crucible or mold of refractory clay. The crucible is then placed in the hole with the stone cover and surrounded with fuel. A blast is then forced and after the copper is melted they uncover the bath taking out all the impurities. The crucible is removed from the furnace and later when the mass commences to consolidate is compressed with stick. Finally they take the cake from the crucible, bury it in ashes until it has cooled and smooth its surface a little by striking it with a stone."

I have been unable to obtain an account of the Spanish methods, the furnace was demolished before I arrived at the mine. From the accounts given me, the appearance of the slags, the high grade of the ore they rejected, as too poor to treat, I gather it must have been much similar to the Mexican method of long ago. There is no present activity in smelting either copper or gold ores.

It would be more or less foolhardy, if not actually absurd, to go into the detail of possible future treatment of the ores before making many careful analyses and tests; it is however possible to state the class of ore met with and give the nature of the minerals and gangue. Of metals we have gold, silver and copper of economic importance. Others such as lead, zinc, antimony, etc., have at the present outlook other purpose than to slightly complicate the smelting process.

A perusal of the previous chapters will show that the ores are rich in sulphur, the gangue silicous. The ores which will demand first attention are those of high grade by which I mean valuing over $30 gross per ton, and the medium grade ores worth from $30 to $16 per ton. The latter figure being, I believe, the lowest that will here stand direct smelting and give a profit of 20 per cent annually on the capitalization. In addition to these there are probably many hundred thousand tons of ore worth from $8 to $15 per ton which it may be found profitable to treat after first crushing and running through jigs or other concentrating plants. I will speak of the high and medium grade ores first.

There is at present no cheaper transportation than that afforded by pony back at $40 per ton. It is believed that by the operation of an automobile service as per the chapter on transportation this rate can be reduced to less than $6 per ton from the coast. Even at this price it will be seen that fuel in large quantities would be expensive. The timber on the surrounding hills has been stripped clean by the Spanish operations and while a little further afield a considerable supply might be obtained it would be absolutely out of the question to think of operating a 250 ton smelter without bringing in coke. The Abra River offers some 15000 h. p. that may be harnessed to supply all the power and light that will be needed. Limestone is close at hand. Unskilled laborers at 50 cents gold *per diem* may be brought from the coast in unlimited quantities and they have been found under good management to be efficient. Skilled men must of course be brought from Europe, America or Australia.

It is safe to suggest that partial pyrite smelting will probably be found possible here. We may reckon on using an additional charge of let us say 5 per cent coke figured on the green ore, which will with the other ingoing supplies about balance the weight of outgoing copper from the medium and high grade ores. Large quantities of the ores, from all over the district should be sent to one of the best of the American metallurgists, who after full experiments will advise and design the proper plant. It is not possible to suggest more here than that the fines will have to be briquetted, the coarse sent direct to the smelter with the fluxes found necessary after practice with them. These ores will, or can be made to average from 8 to 12 per cent copper, the silver content will be large, and if the flux carries much of the pyritous ores about $5 gold per ton. Zinc, antimony and arsenic will not be in large enough quantities to cause trouble. In a plant similar to that of the Tennessee Copper Company and described by Mr. J. Parke Channing, in *Engineering and Mining Journal* of June 22d, 1905, it will possibly be found necessary to concentrate in the furnaces twice before getting a 45 per cent matte. the lowest it would be advisable to convert.

The chapter on costs will show that I believe $16 per ton the minimum value of ore that will give 20 per cent *per annum* on the required capitalization. In an estimate of the nature of this it must however be borne in mind that I cannot afford to figure as closely as I hope and believe actual practice here will eventually warrant. Large bodies of ore worth from $8 up exist here. I believe experiments with large quantities of these ores will demonstrate that they can be economically concentrated about 6 into 1 at a saving of about 60 per cent. This seems low but it must be borne in mind that the sulphides are of very low specific gravity and, crushed, slime readily. Thus by jigs or other similar appliances an $8 ore concentrated 6 to 1 with a 60 per cent saving will make a $28.80 concentrate. If we take from this the cost of mining the extra five tons, concentration, etc., we get about an $18 ore net. And this I believe will not be far from the lowest value that for some time to come it will pay to handle.

Working Methods.—I advise using the topographic map of the district, shortly to be published by the Mining Bureau, as a base, continuing Mr. Eveland's survey to include Southeastern Suyoc, unfortunately not included by him. On this should be plotted every outcrop and ore occurrence in the entire district, with full data, Three months will complete this, during the engineer's spare time.

MANCAYAN MINES.—Firstly a thorough examination should be made of the Mancayan ore occurrences and dumps. This may be completed in 30 days if the existing surveys are accurate, otherwise, it will take double that time at least.

Diamond drilling has many advantages, chief amongst which is its speed. I doubt the advisability of going to the great expense this would incur here; owing to there being no contractors in the country it would be necessary to put a large capital into a plant for which at the best there would be only a short work and that a dead one which would have to be done all over again by shafts and tunnels. Again these are irregular deposits and the core from the drill might give a blank and yet be within a few feet of a rich ore occurrence which in a tunnel would be indicated by a seam and then sought. Again on the other hand the core might give us a very rich sample which on development we would find to be nothing but a little island lense of insufficient size to have warranted the double expenditure of both the drill prospecting and the tunnel.

For these reasons I would not advise using drills at present but following the ore down with an incline shaft 5×9′ sunk on or close to the western diorite-quartz porphyry contact. The driving of a double tunnel 8×10′, from the Mancayan River, closely due E., a distance of about 1100′ to meet the shaft at a vertical depth of some 500′ below the present workings. From the incline, at intervals of 100′ levels will be opened up by driving along the contact NW. and SE. single drifts 5×7′ and in these, commencing at the shaft, lateral drifts will be sent into the quartz porphyry, every 300′, in search of the lenticular ore bodies, which, when found, will be opened up for stoping. On completion of the main double drift the shaft will no longer be used for hoisting but ore will be shot down it from the upper levels to the mail tunnel, by means of a belt or other conveyor so as not to break the ore too finely. The double drift will be the main exit from the mine from which it will be operated until it shall be found advisable to run in a lower one. Approximately a 5,000′ tunnel would cut the quartz porphyry about 1,500′ lower than the present workings.

The Mancayan quartz porphyry is exceedingly hard and native labor very slow in hand drilling, so with ample water power at hand an air-compressor should be erected and the entire development done with rock drilling machines. The pump, in the sinking shaft, might be best driven by air from the compressor.

It will be found cheaper to sink the incline and drive the NW.-SE. galleries through the diorite footwall. This would ensure the entire ore body being on one side, would probably save one third in time, one half in cost of explosives and one third in cost of labor, and air. The long main tunnel will be in diorite for most of its length.

COPPER QUEEN CREEK PROPERTY.—It is essential that an accurate topographic map be made of this property, covering an area of about 250 acres.

The main level tunnels, NE. on the Anaconda and SW. on the Elizabeth should be rapidly advanced to find the limits of the ore body. These prospecting tunnels are at present too small to permit of conveniently moving about in. It will be necessary to immediately enlarge them to 5×7′ at centers, between timbers; somewhat lower down the Copper Queen Creek, about 600′, a suitable tunnel entrance will be found to permit running a tunnel approximately SE. to cut the vein beneath the present entrance of the Elizabeth Tunnel at a depth of about 200′ lower vertically. A tunnel of about 2,500′ would cut the vein at a depth of something like 800′. When the tunnel has cut the vein rise up on it to reach the present tunnel entrance, run NE. and SW. drives along the vein to open it up from the level of the long tunnel and intermediate between it and the present main level. The lowest level connected by cross cutting tunnel with the surface will be the main gallery of the mine through which ore will be brought out.

Copper Queen Creek offers at small cost some 700 h. p. The surrounding hill sides contain sufficient timber for all mine purposes for many years to come. I would suggest here the installation of a small compressor plant and that all development be pushed with some such small machine as the Murphy air-hammer rock drill. The rock is not particularly hard to drill and breaks easily. The cross cutting tunnel through the conglomerate might be driven with an ordinary 3½″ rock drilling machine. It is hard. The air exhaust will ventilate the mine until natural ventilation has been created by connecting drifts and rises.

Some 2200′ SW. of the Copper Queen Creek is a smaller creek which should be carefully prospected for ore occurrences either the continuation of the Anaconda-Elizabeth vein or another.

The Gobossen workings should be first carefully examined, my time was too limited to permit of giving them the close examination they deserved, and then a plan for their development inaugurated.

Below Mancayan will be found a natural smelter site, offering these inducements: It is closer to the coast than would be a site in the center of the mines (if this were not objectionable for other reasons), meaning less cost for the transportation of incoming supplies and fuel and outgoing copper; it is at sufficiently much lower elevation to permit ores being sent by gravity from the mines to the smelter; it is close to a power site.

The initial plant will probably have a capacity of 250 tons *per diem* of green ore. It is cheaper to start with a small smelter, keep it running and increase its capacity as found advisable than to start with a large one and have part of it idle for a long time.

Copper Queen Creek and Suyoc ores may be sent from the mines to the Mancayan smelter by means of an aerial tramway, requiring power only to start it, the weight of the full, downgoing buckets will operate it.

During the few early years of development the underground secondary galleries will be fitted with 12-lb. rails, the main galleries with 20-lb. ones. Self-tipping iron trucks of not more than 10 cu. ft. capacity will be used to transport the ore. Igorot trammers at 30 cents gold per shift may be obtained in sufficient quantity to operate them.

The reduction plant will be designed by an experienced metallurgist after thorough tests of the various ores have been made. Should future development demonstrate the need of a large concentrating plant it will be similarly designed.

Skilled labor will have to be imported. The cost of living here compares favorably with that of the western American mining camps, the climate is an ideally healthy one. Wages should therefore for Europeans not cost more tham 20 per cent over the scale in the Western United States. Japanese, in quantity, as engine drivers, blacksmiths, tool-sharpeners, miners, machine men, carpenters, masons, etc., may be procured at wages ranging from $1 to $1.75, gold, per shift. Ilocanos (Filipinos from the coast) may be procured in large numbers as unskilled laborers at a wage of 50 cents gold per shift. There will hardly be much to apprehend here from strikes at present.

ABRA RIVER PLACERS.—A glance at the reference map of Northern Luzon will show a river completely encircling the Mancayan-Suyoc mineral area. This is the Abra River, which rising in NE-Suyoc, on the western slope of Mt. Datá, flows in a general southerly direction until past its confluence with Copper Queen Creek, it describes a semi-circle of about a 4-m. radius, then, keeping Mancayan and Suyoc a few thousand feet to its E., takes up its long northerly journey to the coast, at Vigan, which it reaches after a meander of about 100 ms.

Each of the many rapid flowing mountain streams, which cut the rich gold veins of Suyoc, finds its way to the Abra River before it has passed Suyoc's northern limit. These are laden with a freight of rock and gold, eroded from all over the district. The Abra River in its journey around Suyoc and to the beginning of the Comillas flat, where the placers commence, has a fall of about 1 in 25, too steep to permit precipitating its valuable load, which is thus carried on, the while being ground smaller and smaller and the gold freed.

At the Comillas Valley the gradient drops to 1 in 100 and precipitation commences. The valley has a length of some 20,000-odd feet by a width of closely 3000′, here, with the numerous large pebbles and boulders has been formed a natural sluice box from which but little gold has escaped. Only in the floods does the rushing torrent of muddy water carry away the finer floating gold.

The placers extend in a general N.-S. direction over a length of some 4 ms., the river through them having a meandered length of closely 5 ms. The northern end is within a mile of Cervantes, the capital of Lepanto-Bontoc Province.

As yet the placers have not been thoroughly prospected. I completed a topographic survey of them. A study of the accompanying map and sections taken from it will serve to give an idea of the quantity of gravel and the general conditions under which it is found.

Some centuries ago, when the rainfall was probably twice the present 120″ *per annum*, the Abra River flowed some 2000 to 4000′ from the site of its present bed, its meandering formed the highest of the benches, the largest. In cutting its way to a lower level and finding an entirely new outlet to the east of the long butte which once was its eastern bank, it has formed several benches, which show exposures of from ten to fifty feet of gravel. Undoubtedly it has built up and partly torn down, thus concentrating increased values into some of the later and shallower benches close to its present bed. Two cross-cutting streams have thus also made, over considerable areas, richer shallow placers. In times of flood many large boulders were brought down by the river and deposited all over the benches. These pebbles varying in size from 9″ to 3′ in diameter have made riffles that formed a perfect sluice box. Fortunately the aggregate of the large pebbles is not much more than 5 per cent of the total gravels and will therefore not appreciably increase the cost of working.

I estimate the total quantity of gravel to be roughly 35,000,000 cu. yds., although thorough prospecting may prove double that amount. Much of this will average in the neighborhood of 20 cents gold per cu. yd. Considerable areas of the shallower benches, where the gravels have been worked over and over, will probably go very much higher. I am not in a position to speak of the bed rock values. The bed rock itself is diorite and basalt.

I would advise the sinking of 61 shafts, as indicated, through the gravels to bed rock. These will be circular wells of about 3′ diameter, protected at the top by a 2′ high stone wall with ditch around it. Every foot of gravel taken from these shafts should be sampled and a fair portion of it taken for panning. The pebbles measuring over 6″ in diameter should be placed aside that an accurate idea may be had as to their proportion to the total. This work if properly done will show within a small margin the actual value of the placers, gross and net.

Hydraulicking, in the California and New Zealand sense, will not be possible here owing to the impossibility of securing the requisite fall. It might be found practicable to elevate the gravels some 60′ or so which would give sufficient fall for sluicing in a 2000′ box but would by no means solve the question of tailing's disposal, excepting they could be economically handled by means of belt conveyors.

Dredging seems to me the only certain method of working these placers. An enormous water power is immediately at hand from which electric power could be economically developed to work as many dredges as might be thought best to put in. Surplus power could be sold to the neighboring Mancayan and Suyoc mines if they advance sufficiently to require it. There is absolutely no fuel of any kind within a reasonable distance. Ample cheap unskilled labor (50 cents gold per shift) may be procured from the coast. The general conditions are such that the usual tropical cost increasers of placer mining are not to be expected. The elevation is about 1500′. I should judge that gravel going 8 cents gold per cubic yard would pay a profit.

It will be in better taste to wait until the placers have been thoroughly prospected before estimating their value. $2,500 exclusive of engineer's fee will suffice to do the work I have outlined.

TRANSPORTATION—The question of next importance, here, after the presence of sufficiently valuable ore deposits has been determined, is that of reasonably cheap transportation. We may take the smelter site as the center of our calculations, as it is the most important place for us, in this regard. This has an elevation of approximately 3,000′, is about 7 ms. NW. of the most distant of our mines, the Anaconda and Elizabeth tunnels which have an elevation of about 5,000′. Aerial tramways must give the only solution of the problem of local transportation; as there is no economic problem connected with their installation, other than securing the money to pay for them. I will not under this heading give local transportation more space.

The Cantabra Filipino Company and the leasers who succeeded Sr. Santos in the operation of the Spanish mines during a period of 36 yrs. paid little or no attention to the question of transportation. They must have realized immediately, if indeed they gave it thought at all, the impracticability of shipping out ore. Their operations were conducted on so small a scale they had no serious difficulty in procuring all the charcoal fuel they needed from the surrounding mountains. Their copper product was shipped out on pony back balancing the few supplies they required sent in. Their ports were Candon and Vigan with which they were connected by horse trails, *via* Cervantes; these are still in use as also is a newer one just completed to Tagudin. All the coast towns are connected by fairly decent wagon roads. A narrow mountain trail through Suyoc connects with Baguio, the capital of Benguet Province, from whence there is a good wagon road to the railway at Dagupan. Another somewhat longer trail *via* Cabayan and Ambaklau makes the same Baguio connection with Suyoc.

At present all supplies are brought into Lepanto *via* Candon, on pony back at a cost by contract of $40 gold per ton. It requires little study to suggest that this is somewhat expensive and prohibitive for all else than a gold bonanza, which unfortunately I have not yet found here.

It has been suggested by engineers that a railroad might be built over the mountains to Baguio. I see no reason to doubt this, but am of the opinion that it could not be done at a lower cost than $2,500,000 for the grade alone, and I can see no traffic for it after completion. This may therefore be eliminated from our calculations. Others have suggested a railroad down the Abra River Valley to Vigan. This would mean over 80 ms. of track at an even heavier first cost than the Baguio idea, with, however, this in its favor that there is every reason to believe the road for 60 ms. from the coast would pay handsomely. I doubt its ever becoming an aid or relief to the mining industry of the province.

The closest railway connection to be had would be the coast at Tagudin which now has a horse trail from Cervantes on a maximum 6 per cent grade. The distance on an air-line from the smelter site is about 26 ms. I believe that a railway having a length of approximately 35 ms. could be constructed on a maximum 6 per cent grade with sharpest curves, say, a 100 foot radius, fully equipped for about $1,750,000, gold, obviously the fixed charges on such a capital would be sufficient to prevent its construction for many years to come, certainly not for 10 yrs. after the mines are taken hold of. We may therefore, sorrowfully, but none the less certainly, put a railroad out of our minds.

I have spent considerable time on the thought of putting in an aerial tramway from the mines to the coast and erecting the smelter there. It has its *pros* and *cons*. The first cost will be pretty much the same or heavier than that of the relief I will give as the safest. The cost of operating the tramway will be pretty much the same. There is, however, always the chance of a breakdown during the terrible typhoon season which would lay up the smelter for a week, every now and then. Also I am averse to building the smelter in the center of an average temperature of 80° F. Our skilled smelter men would not last long and with unskilled men the costs would be too high and the results too poor.

I believe that a good wagon road can be built from the smelter site to Tagudin, practically on the same grade as would the railroad I speak of above. The cost I estimate at $175,000. In the future it can always be turned into a railroad grade by a little more grading and attention to curvature. This I propose using as an automobile road, operating on it six 10-ton automobile trucks, of heavy construction, such as are not unfrequently met with in America. In my calculations, based on smelting 250 tons *per diem* of sulphide ores, assaying an average of about 8 per cent copper, I find that three trucks, such as I mention above would meet our requirements during 6 or 8 mos. in the year, from June 15th to October 15th each year it will be found necessary to run along the coast from Tagudin to San Fernando from whence on completion of the railroad connecting it with Dagapan, to be completed withing 2 yrs., direct railroad communication can be had with Manila, the island's largest port where on completion of the new port works large vessels may lie alongside dock. This will require an additional three trucks. These trucks will carry 5 tons of coke or 8 tons of copper and on occasion may be made to handle a 10 ton load. They will be of 60 h. p., driven by an European *chauffeur* with a native helper.

The Government is suffering from the effects of expecting the Malay to work when he does not have to, resulting in postponement after postponement of the land tax. The Malay does not take any too kindly to agricultural work, although when he has to he will do it. He is a good mechanic and likes the work. Consequently little or no finantial aid is to be counted on from the Government.

It is believed that, as it is really a public necessity, it will put the road from San Fernando to Tagudin in first class condition. The concessionaires who are to construct the railroad from Dagupan to San Fernando also have a charter for a road along the coast to Laog which will pass through Tagudin.

An automobile service is no longer an experiment. It is in active operation in many places. In Death Valley, a 100 ton automobile traction engine daily hauls 20 cars laden with 100 tons of borax from the desert to civilization. A traction engine will hardly do here on account of the curvature and its long trailing load.

CONCLUSIONS.—Mancayan presents an attractive mining proposition which should receive a thorough examination to determine accurately its undoubted great value. After a preliminary examination I estimate positive ore on dumps of 100,000 tons value $2,000,000, and in the mine ready for stoping 70,000 tons value $2,100,000, both together having a net value of about $2,125,000, gold; beyond these conservative estimates none are advisable until a thorough examination of the mine has been completed.

Suyoc presents many promising prospects which warrant energetic development backed by sufficient capital to ensure success.

The Abra River placers should be thoroughly prospected to prove the quantitly of gravel and its value. The other conditions are right.

Labor is at hand in sufficient quantity for prospecting and preliminary development. Fifty miles away the coast will supply all the unskilled labor required to operate a second Butte.

Water power may be developed in the district up to 15,000 h. p. Much more may be harnessed somewhat further afield.

The ores are such as to permit of partial pyrite smelting and the coke required to be brought in will not equal the copper to be sent out. Large quantities of charcoal may be burned from lumber standing within a radius of a few miles.

The transportation problem is simply that hitherto nothing has warranted the expenditure of even a moderate sum of money to construct a wagon road because there would have been nothing to ship over it. Once the fields are demonstrated to warrant the small expenditure stated under "Transportation" 12 mos. will make this no longer a problem.

MANILA'S BUDGET, 1906-7

The Philippine Commission has passed the appropriation bill for the Municipality of Manila covering the fiscal year to end June 30th, 1907. The total of appropriations for all purposes is ₱3,028,148 80, distributed as follows:—

Municipal Board	₱ 203,000
Law Department	117,000
Fire Department	290,000
Police Department	837,500
Department of City Schools	292,000
Department of Assessments and Collections	107,500
Department of Engineering and Public Works	544,000
Department of Sanitation and Transportation	595,000
Public Works	42,184.80
Total	₱3,028,148.80

PEARLING INDUSTRY IN THE SULU WATERS OF THE PHILIPPINES

(Concluded from page 197.)

rake become lodged at the bottom of the sea, it is pulled out by means of the thinner rattan and the operation proceeds as before

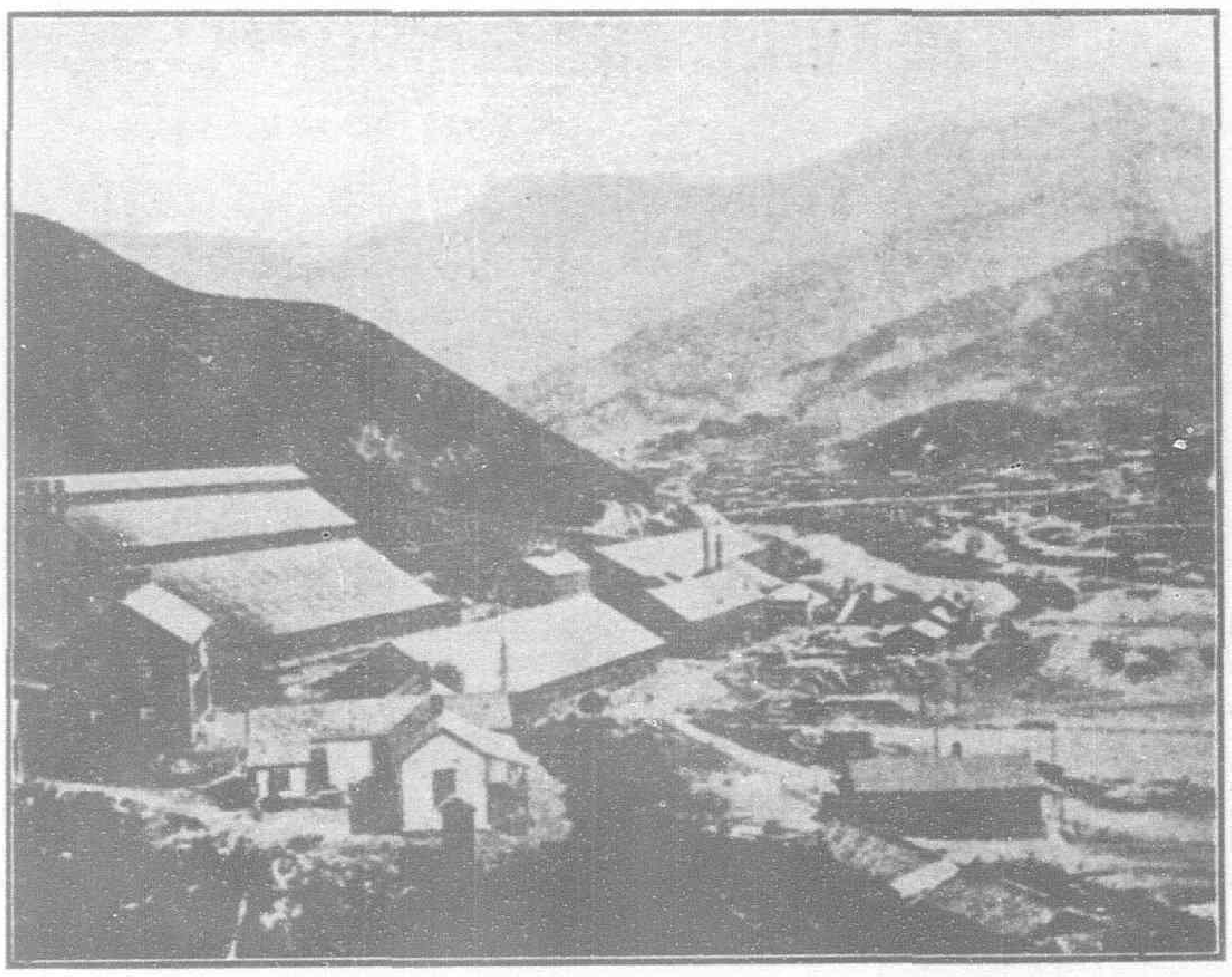
When the tide turns, the boats also turn and go with it.

The shells having been deposited at the bottom of the boat are opened by means of a sharp knife, with which the pearlers cut out the oyster, which they then search for flesh pearls. These latter are uniformly the finest. The points to be sought in a pearl are size, color and luster, sphericity, and freedom from spots, specks and blemishes. Pearls taken from the surface of the shell itself are always deficient in some of these respects.

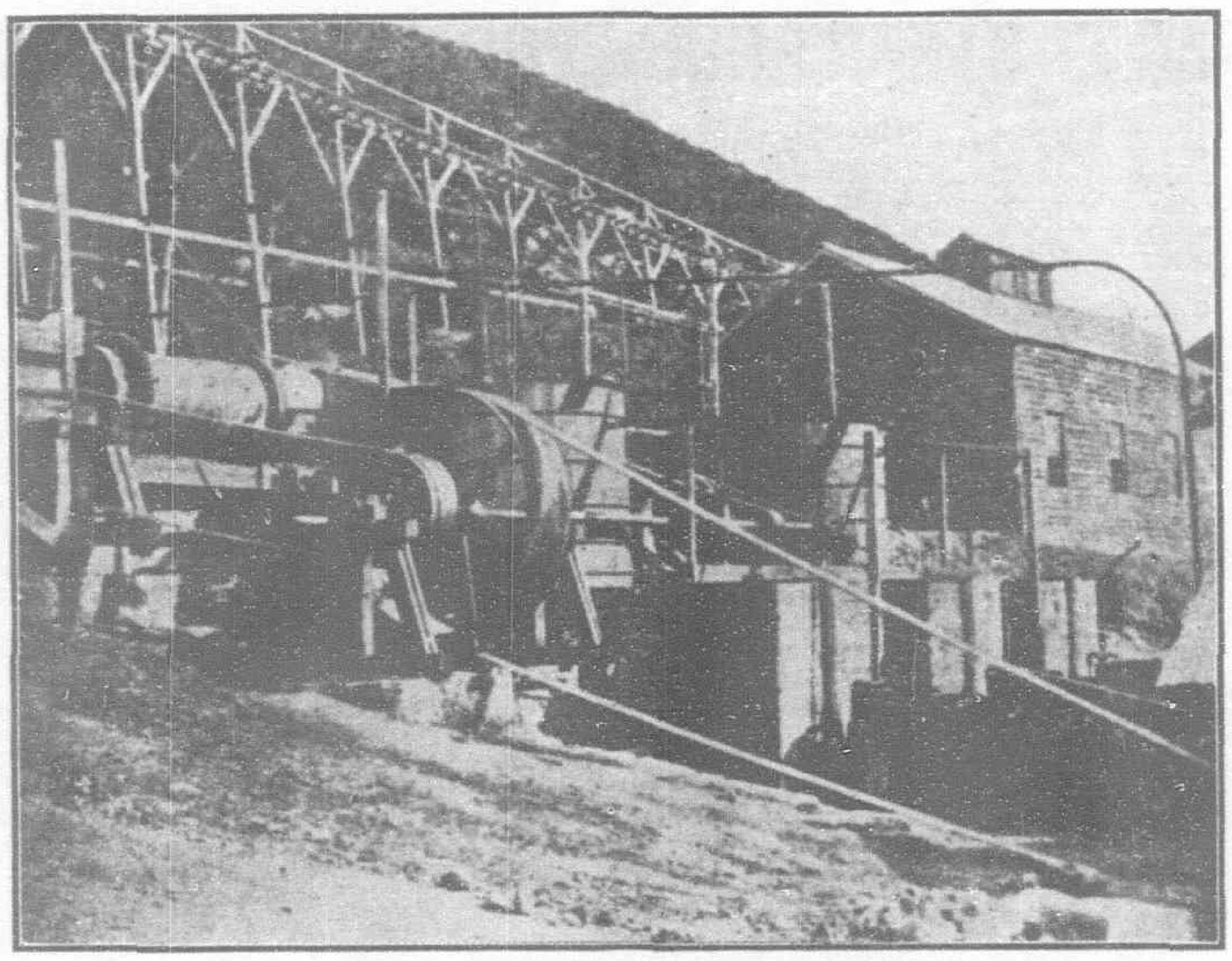
DIVING FOR PEARLS.—In shallow water, where the bottom can be seen, the natives dive for the shells. The boats are paddled along slowly with the tide; a man in the bow keeps a close watch upon the bottom of the sea, which can easily be seen with the naked eye in these clear fishing-grounds, and when a shell is seen he dives head first to secure it. Some of the men are expert divers, going to a depth of 18 to 20 fathoms, unaided by the use of weights.

Deep-water pearling is carried on quite extensively by companies who send many fishing boats out from Jolo. These divers use the diving apparatus, helmet, waterproof suit, pump, etc. Many valuable finds occur at great depth.

MARKET HAMPERED BY DATUS.—The sale of pearls, before the American government regulated the industry, was greatly hampered by the Moro chiefs. The natives' lives were very open. Whenever a man did anything the fact was usually generally known. Due to the autocratic power possessed by the chiefs, they claimed and took nearly everything they wished. If a fisherman found a pearl of any value it was at once appropriated by the chief. Should he have sold it and the transaction reached the ears of his datu, the man would be fined a greater sum than the value of the pearl, or otherwise punished. This led to sequestration of their funds and to clandestine dealings with the pearl traders.



TARACOL GOLD-MINING CAMP, KOREA



TUBE-MILL AND EXPERIMENTAL CYANIDE PLANT

EXPERIMENTAL TUBE-MILLING IN A KOREAN GOLD MINE

(Concluded from page 190.)

By feeding the concentrate and cyanide solution with a consistence of one to one through the tube-mill, we are able to get the finest grinding and the best results. The agitators will only have to be filled once to contain a full charge. While one agitator is being filled, the other is decanting and getting ready to be discharged. At the head of the launder (leading from mill to agitator) a pipe was run to the stock cyanide vat above, so that we can add enough solution to keep the launder clear. With clean concentrate, it is necessary to have a steep grade.

The strong cyanide solution (0.43 per cent) is used in the tube-mill and agitators, while the weak one—employed for washes—tests 0.1 per cent. No cyanide is added to the weak solution. Lime is added (about 2 lbs. per ton) with the concentrate as it is fed into the mill.

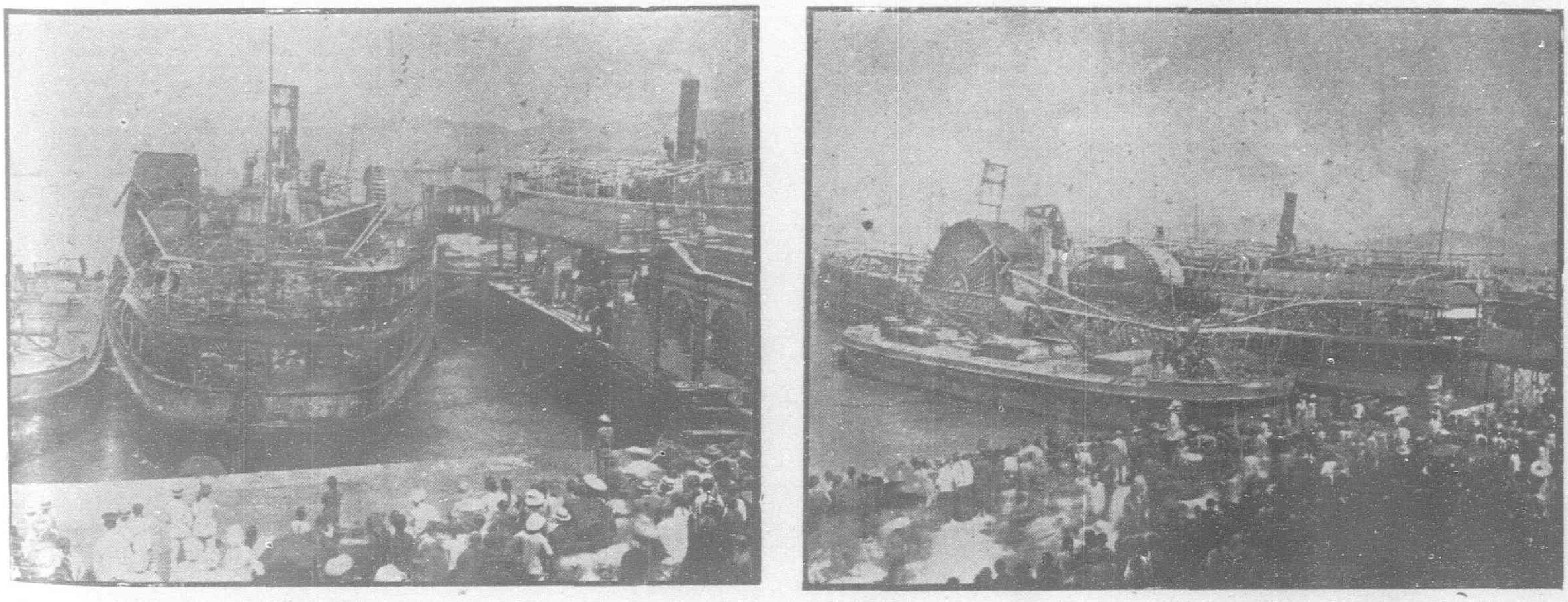
The old method of cyaniding concentrate here is by mixing with 48 per cent sand and percolating in vats from 20 to 30 days. This method gives an average extraction of 80 per cent.

The extraction obtained at present with the tube-mill and agitators on clean concentrate is 93 per cent. By gradually making improvements we may possibly better these results.

CANTON RIVER STEAMER "HANKOW"

The Canton River steamer *Hankow*, which was practically gutted by fire at her mooring in Hongkong, October 14th, was a fine vessel and one of the last of her type in the Far East. In this connection *The New Weekly*, published in Hongkong, says:—

"The *Hankow's* old-style walking beam and huge paddles went out of date long ago, and the twin screws are all the vogue. It does not say that because the paddles have been superseded by the screws that the screws are the best. There are engineers who will tell you that for the work on which the *Hankow* was engaged the paddles are the best. She was certainly a cheaper boat to run than, say, the *Powan*. Her coal consumption was less and her cost of upkeep was less. The huge paddle wneels of the *Hankow* are of a type specially designed by those interested in her construction. Most paddle wheels are smaller in diameter and are worked on a different principle, but the *Hankow* has always acted up to her makers' hopes. She was a popular vessel, has done good work, and will no doubt continue to do so when her superstructure is rebuilt. The *Hankow* was one of three sister ships which were built for the Far Eastern river trade. She is about 32 years of age and was in a wonderful state of preservation; her hull being, in shipping parlance, as "sound as a bell. Her superstructure, which has been destroyed by the fire, was renewed 18 years ago. Before going into the service of the Macao Steamboat Company she plied on the Yangtsze River and has always been a great favorite with Chinese passengers. The *Hankow*, it is interesting to note, had a predecessor of the same name in Chinese waters which was destroyed by fire at Canton in 1865. The bell from this steamer is now on the well-known excursion steamer *Heungshang*, which still remains on the rocks, where she ran ashore during the great typhoon and it was from a mould made from this bell that the bell for the Peak Church was cast. There was, however, no connection between the *Hankows*, the first being operated by an entirely different company. The *Hankow's* sister ships were the *Peking* and the *Shanghai* and the former is still running between Shanghai and Ningpo. The *Shanghai* was, years ago, destroyed by fire on the Yangtsze River."



Illustrations by courtesy of *The New Weekly*, Hongkong.

TWO VIEWS OF THE HONGKONG-CANTON RIVER STEAMER "HANKOW" AFTER HER PARTIAL DESTRUCTION BY FIRE

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

PERSONAL

MR. J. W. BEARDSLEY, C. E., M. Am. Soc. C. E., Director of the Bureau of Engineering of the Philippine Islands, has returned to his post of duty after an extended vacation in America.

MR. RICHARD T. LAFFIN, 2d Vice-president and General Manager of the Manila Electric Railroad and Light Company, has returned to his post of duty after an extended business sojourn in New York City. He returned to the Philippines *via* the Suez Route.

MR. CHARLES M. SWIFT, President of the Manila Electric Railroad and Light Company and one of the promoters of the railway system on the Islands of Cebu, Panay and Negros, Philippine Islands, will arrive in Manila from the homeland shortly after the first of the new year.

VICEPRESIDENT AND CHIEF ENGINEER WILLIAM POLAND, of the Philippine Railway Company, which has undertaken the construction and operation of the new railroads in the Visayan Islands, is *en route* to Manila where he will establish offices, Mr. Poland was formerly chief engineer of the Alaskan Railroads.

ELECTRIC LIGHT, ETC.

KOYTO-OSAKA ELECTRIC RAILWAY.—The survey for an electric line between Koyto and Osaka is in progress. The construction is expected to be completed within 18 months.

MILITARY TELEGRAPH LINES, PHILIPPINES.—Arrangements are being perfected by the War Department at Washington for turning over all the military telegraph lines in the Philippines Division to the Civil Government.

ELECTRIC RAILWAY AMALGAMATION, JAPAN.—There is good prospect, according to *The Japan Times*, that four electric railways—the Keihin, the Yokohama, the Enoshima, and the Odawara—will be amalgamated, and that the projected Atsugi line will join the union.

TRAMWAY, SAGHALIEN —The Japanese Government have commenced the work of constructing an omnibus railway between Korsakoff and Vladimirofska, about twenty miles. The construction will be concluded in June. The cost is reported to be about a hundred thousand *yen*.

NEW ELECTRIC RAILWAY SYSTEM, KYOTO.—Japanese capitalists are organizing a company for the purpose of constructing and operating a new system of electric railways at Kyoto. It will have a capital of -Y-3,005,000, divided into 60,000 shares. The system will be 15 miles in length and run through and around the City of Kyoto.

RAILWAY, ETC.

HANGCHOW RAILWAY.—The route of the Hangchow Railway has been fixed, and will pass from Kiangkan, along the eastern side of the Grand Canal, to Hungchinkiao *via* Konshanmen.

KAWASAKI DOCKYARD COMPANY.—This company is reported to have made arrangements to begin the business of the manufacture of railway locomotives, carriages, freight cars, etc., the articles of association of the company having been amended accordingly.

SHANTUNG (CHINA) RAILWAY.—This line did a prosperous business last year, having conveyed 30,000 tone of freight and 795,000 passengers, which is an increasr of 65 per cent in point of freight and 42.5 per cent larges in passenger traffic than the preceding year.

RAILWAY COAT-OF-ARMS, F. M. S.—The Railway Department of the Federated Malay States has adopted the following coat-of-arms, which will surmount the doorways of all stations:—On a field verte, a car sable, surmounted by an "A" gules and a "B" argent; supporters a European and an Asiatic, rampant, regardant; crest, an Autocrat, on a wreath of the colors; motto *Stat pro ratione voluntas.*

RAILWAY BUILDING IN CHINA.—Railway building in the Namti Valley, China, is more destructive to human life than ever was the case with work on the Isthmian Canal. The American consul at Nanking, Mr. T. Haynes, reports that the death rate in that valley in China is 70 per cent of the total number of men employed, and even then work is suspended and the men removed during the summer rains.

DOUBLE-TRACKING THE SIBERIAN RAILWAY.—The Russian authorities have decided that the work of laying down a second line of rails along the Siberian Railway shall be begun next spring, and that until that time certain branch lines shall be laid down, as already projected, to connect the Siberian Railway with Tashkend in Russian Central Asia and with the Steppe region northeast of the Aral Sea.—*The London and China Express.*

RAILROADS IN VISAYAN ISLANDS, P. I.—Governor-General James F. Smith, accompanied by several high Government officials; Mr. F. A. Molitor, Supervising Railway Expert, and E. J. Beard, Chief Engineer to Messrs. J. G. White & Co., constructing contractors for the Philippine Railway Company, visited Cebu about the middle of the current month, where the Governor-General formally inaugurated the actual construction of the railroads in the Visayan Islands, which are being built under Government concession.

PEKING-KALGAN RAILWAY.—The section of the Peking-Kalgan Railway from Fengtai to Nankow has been opened to traffic. This line is being entirely undertaken by Chinese. Fengtai to Nankow represents one fourths of the whole line completed, which will tap the smokeless coal region of Chimingshan. The ties used in the construction are partly from Japan and partly from America, but the locomotives are from England. Three-fourths of the line are still under construction which requires a large quantity of timber and great expenditures.

CANTON-SAM SHUI RAILWAY.—It is reported from Canton that the Canton-Sam Shui branch of the Canton-Hankow Railway, is in such a dilapidated state owing to the neglect of maintenance of way by the Chinese that it will require the expenditure of about $1,060,000 to restore the line. Some foreign engineers lay the trouble to the American engineers who built the line, but the latter fix the blame upon the Chinese. The directors of the company are greatly discouraged over the condition of the road, and are experiencing difficulty in finding the means to effect the necessary repairs.

SPEYER RAILWAY SYNDICATE, PHILIPPINE ISLANDS.—General Manager Horace L. Higgins, of the Manila & Dagupan Railway, representing the Speyer Syndicate, which is to construct railroads on the Island of Luzon under Government concession, and the Manila Navigation Company have closed a deal whereby the property of the navigation company becomes the property of the syndicate. Three river steamers, three steam launches, 22 steam lighters, a number of cascoes and a shipyard at Pandacan, represent the property involved in the deal and will be utilized in the construction of the new lines of railway in the transportation of materials and supplies.

TARLAC RAILROAD, NORTHERN LUZON, LUZON, P. I.—The construction of the Tarlac railroad is progressing most satisfactorily. Manager Thurber, of the Manila Construction Company, has a force of 300 native laborers on the job at the Panique end of the line, and rails are being laid as rapidly as the grading is finished. The ties, all of native timber, are distributed along the route to Camiling, and the rails, all of which have been received in Manila, are being carried north as quickly as possible. Bridge and culvert work is keeping pace with the ground-level construction, and it is the belief of the company promoting the line that it will be open for the handling of freight by the time the crops for this year are ready for shipment, which will be about January.

MUKDEN TO ANTUNG BY RAIL.—Says *The London & China Express*:—The trip from Mukden to Antung is very invigorating as the miniature engine and trucks toil up and down and around all angles and grades, but with rarely an accident. The scenery is very beautiful. The line from Wiju on the Yalu River to Seoul is well laid and has some very fine carriages. When all the railways are finished Mukden will be a great railway center, with its lines to Fusan (for Japan) and Port Arthur, or Tairen (Ta Lien or Dalny) for Shanghai; and the line for Peking, Tientsin or Hankow and Central China. The line to Antung is at present a light military road, but a permanent one is being constructed. Very much is yet to be done to put the stations on the main line affected by the war into proper condition.

RAILWAY ROLLING STOCK, SIAM.—The decision with regard to the bids for rolling stock that were publicly opened on September 4th, at the head office of the Royal Siamese Railway Department, Bangkok, has been announced, and tenders accepted as follows:—*Baume et Marpent, Haine St. Pierre, Belgium*—Fifty open iron wagons without brake, unit price £180, total £9,000; 50 open iron wagons with brake, unit price £196, total £9,800. *Ban der Zypen & Charlier, Cöln, Deutz.*—One inspection car, £1,446; eight wooden covered wagons for piece goods, with shelves, unit price £260 15s, total £2,086; 35 iron covered wagons without brakes, unit price £173 5*s*, total £6,060 15*s*; 15 iron covered wagons with brakes, unit price £196 17*s*, total £2,952 15*s*; 11 cattle wagons without brakes, unit price £268 12*s*, total £2,954 12*s*; five cattle wagons with brakes, unit price £292 12*s*, total £1,463; 11 timber truck pairs unit price £233 7*s*, total £2,566 17*s*. *Brush Electrical Engineering Company, Ltd., London S. E.*—Eight composite carriages for 1st- and 3d-class, unit price £585, total £4,680; 10 composite carriages for 2d- and 3d-class, unit price £562, total £5,620; 32 3d-class carriages without brakes, unit price £493, total £15,776; 16 3d-class carriages with brakes, unit price £513, total £8,208; seven guard and luggage vans, unit price £426, total £2,982.

RAILWAY CONSTRUCTION IN JAPAN.—The actual condition of State-railway work in Japan is given as follows:—*West Central Line, Between Nagoya and Miyakoshi*—Work is proceeding on the 10-mile section from the Nakatsu River to Sakashita and on the iron bridge over the Kiso. East of Sakashita the route has been surveyed and the land is being purchased. *East Inyo Line, Maizuru*—Work has been commenced on the 4½ mile section from Ayabe to Sonobe, and surveys are being made of the Fukushima-Wadayama and Wadayama-Shirosaki sections. *Hokuriku Line, Toyama to Naoetsu, 75 Miles*—The survey of the Toyama-Uwatsu position has been finished and the land is being purchased. *Kagoshima Line, Kagoshima to Yatsushiro, 92 Miles*—The portion between Kagoshima and Yoshimatsu has already been opened and work is proceeding on the Yoshimatsu-Hitoyoshi and Hitoyoshi-Yatsushiro sections, a distance of 52 miles. Between Yoshimatsu and Hitoyoshi there is an 8,000′ tunnel at Yadake so that the work will not be completed before 1909. *Hokkaido Line, Oshigawa to Kutshiro*—This road has been opened with the exception of the 42-mile section between Ochiai and Obohiro, and on which work is now progressing. *Doubling the Tokaido Line*—Portions of this work have been finished and portions are in hand. Two sections have not yet been touched, *viz.*, that between Nakaizumi and the Tenryn River, and that between Gifu and the Kiso.

PUBLIC AND PORT WORKS, ETC.

FOOCHOW DOCKS.—The Council of Army Reorganization of the Chinese Government has decided to improve the dock at Foochow and appoint a responsible official as director of the dock.

PROVINCIAL SCHOOL BUILDING, SORSOGON, P. I.—The people of the Province of Sorsogon, P. I., have begun the construction of a provincial school building which will cost $75,000 gold.

PORT OF RANGOON, BURMA.—The shipping interests of Rangoon are threatened very considerably by the rapid silting up of the Hastings Shoal, so much so that the shipping agents have asked the port commissioners for relief.

INSULAR LUMBER COMPANY.—This company is about to begin the construction of a sawmill on its valuable tract of timber land in the Visayan Group, Philippine Islands, which will be equipped with modern machinery and have a capacity of sawing 200,000′ of lumber per day. The construction will be under the supervision of Mr. W. A. Campbell, M. E.

NEW MITSUI WORKS, KOBE.—The application made to the Japanese Government by the Mitsui Family for permission to reclaim the seafront in the vicinity of the new Ikutagawa, Kobé, with permission to construct a landing place there, has been granted. The Kobé Harbor Works plan, published by the Minister of Finance, is said to include the Mitsui works.

TIENTSIN BUND IMPROVEMENTS.—The work in connection with the erection of shear legs on the Tientsin Bund, opposite Bromley-rd, is progressing. The wharf on which they are to stand is nearing completion, all the piles having been driven in. A few more weeks will see the bund equipped with this necessary apparatus for commerce.

DRYDOCKS AT MOJI.—A Japanese syndicate has obtained permission from the Tokyo Government to construct drydocks at Moji. An extensive area of land will be reclaimed at Okubo, Moji, and two docks built thereon, work to begin next (December) month. The undertaking is expected to be completed by the end of 1908 and the cost is estimated at -Y5,000,000.

LAND RECLAMATION IN INDIA.—A scheme is proposed at Lahore, India, by the Government to reclaim a large area of land on the Dutch plan. The Rann of Cutch is a seashore waste, with narrow inlets which would be closed, allowing the shallow water to evaporate. The saline deposits would be washed out by a great canal from the Indus. The application of scientific agriculture to the reclaimed land and the construction of a railway linking Karachi and Bombay would complete the enterprise.

FLOATING DOCK, TSINGTAU, CHINA.—The floating dock at this German Colony is capable of taking in vessels of 16,000 tons capacity. It is fitted with the most modern appliances for lighting with an electrical supply operated from a central station, so that work may be carried on during the night. A steam plant is also provided that vessels in the dock may be heated during the winter. The shops are fitted for all kinds of work, and two cranes of 20 tons capacity each are available. The dock rates differ according to the size of the vessel, from about 20 cents gold per ton for a 500-ton vessel to 10 cents gold per ton for a vessel of 6,000 tons up.

SINGAPORE BUDGET, 1907.—The revenue of the Municipality of Singapore for 1907 is estimated to be $2,775,495, and the expenditure $2,768,461. The question of improving the sewage disposal system has been shelved, although hundreds of thousands of dollars are appropriated for electric power, new river bridges, roads, etc. Assessments are expected to show an increase of about $85,000 and rents of $10,000. The gas supply shows a falling off in estimated revenue, while no increase is expected from electricity. "It is interesting to note," says the *Singapore Free Press*, "that, roughly speaking, the cost of staff or *personal emoluments* in the municipality is about 19 per cent of the receipts, while in the Government administration the cost is about 28 per cent of the revenues.

OSAKA WATER WORKS:—Owing to the remarkable increase of late in the population of Osaka, now exceeding a million, the accommodation of the existing water-works is quite inadequate. The water-works were extended about five years ago to supply water to a population of 800,000, so that in the summer the supply of water has to be cut off for certain hours every day. The Municipal Council has now adopted a scheme for the further extension of the works, which is estimated to cost Y11,000,000. It is proposed to construct the intake works at Kunijima, and a filtering-bed and a reservoir near Suita, 250ft. above sea-level. The money required for the extension will be raised by means of a foreign loan, with interest not exceeding 5½ per cent, the actual face-value to be advanced without discount. The scheme will be laid before the Municipal Assembly in a few days

SHIPBUILDING, ETC.

URAGA SHIPBUILDING COMPANY.—This company intends to establish further shipbuilding yards, and for this purpose has increased its capital from $950,000 gold to $1,200,000.

DESTROYER "UDZUKI" LAUNCHED.—The Japanese destroyer *Udzuki* has been successfully launched from the Kawasaki dockyard, Kobé. She is one of five destroyers ordered from the company.

Dock Laborers' Strike, Hongkong.—The strike at the Hongkong dockyard ended recently in the complete defeat of the men, who gave up their demand for an increase in wages and returned to work.

U. S. S. "Ranger" a Training Ship.—The Navy Department at Washington has agreed to turn over the ship *Ranger* to the Government of the Philippine Islands for the purposes of a training ship for the use of the insular nautical school, the students of which are Filipinos. The *Ranger* has been in commission with the Asiatic Fleet.

River Steamer "Hankow" Burned.—The Canton River steamer *Hankow*, owned by Messrs. Butterfield & Swire, was burned at her wharf in Hongkong Harbor, October 14th. She was valued at $400,000, and including this sum the estimated loss which takes in cargo, is $1,020,000. About 130 persons were killed in the catastrophe.

Saving the "Manchuria."—It is estimated that the cost of pulling the big liner *Manchuria* off the reef near Honolulu and taking her to port will amount to more than $500,000. One hundred thousand dollars worth of tackle was left at the bottom of the ocean. Litigation over salvage has been avoided by definite agreements with the owners of all steamers that participated.

Kure Naval Arsenal, Japan.—Papers received from Japan announce that the Naval Office at Tokyo has decided to make the Kure Naval Arsenal the greatest shipbuilding yard in the Far East. At the present the Kure Arsenal has a steel foundry that can turn out 12″ and 8″ guns. Recently the slips for building the battleships *Aki* and *Ikoma* have been laid out, each measuring 400 yards in length. The number of ordnance works has been increased from 14 to 16. Other works are also being enlarged.

Repairs to U. S. A. T. "McClellan."—The War Department at Washington has awarded the contract for repairs to the transport *McClellan* to the Tanjong Pagar Dock Board, with works at Singapore, and the ship has sailed from Manila under her own steam for that place, conveyed by a tender belonging to the contracting company. The Tanjong Pagar Dock Board's bid was $55,079 gold, and eight months will be required to complete the job. The bid of the Shanghai Dock and Engineering Company, Ltd., was lower than that of the Singapore company, but by its terms 10 months would have been required to make the repairs. The question as to whether it was desirable to have the work done two months sooner and pay more money for it, was submitted by the Chief Quartermaster of the Philippines Division to the Quartermaster-General of the Army, with the result as above stated.

River Navigation in China.—According to the *South China Morning Post*, the Marine Iron Works of Chicago, in addressing the American Consulate at Hongkong recently, had this to say of interest to owners of water craft:—"It can only be a question of time when the majority of the many rivers of China will each have to use at least a few powerful very light-draft steamboats. We refer to the head waters and central portions of those rivers in particular. Neither does their swift current and shallowness prevent the sucessful operation of suitable vessels. It may interest you to know that we are just completing a similar boat for the Hudson Bay Company of Canada, for use on the Mackenzie River, a run of over 1,000 miles. These boats average about 18″ draft ready to load, and it is not unusual to build them for carrying from one to 10 tons of cargo on each additional inch of draft, according to the hull dimensions."

MINES, MINING AND MINERALS

Pumps in Australia.—There is a large trade in Australia in mining pumps just at present.

Ibaraki (Japan) Coal Mining Company.—With a view to supply the rapidly increasing market effectively, this company has installed new machinery, and with these improvements it can work over 10,000,000 *kin* of coal per month.

Gold Yields of Japan and Formosa.—The yields of gold for Japan and Formosa, for 1905, are estimated at 95,000 and 66,000 ozs., respectively. Each country has shown a steady increase for some years past, and each has the capacity for further expansion, especially Formosa.

Shantung (China) Mining Company.—The business of this company is progressing, turning out at the present time about 135,000 tons of coal per year. There are 2,000 Chinese employed at the main diggings, and their pay averages from 20 to 40 cents gold per day. They work in shifts of eight hours.

Coal Trade of Moji.—The quantity of coal shipped to foreign countries from Moji during September was 58,146 tons, and that taken by foreign vessels for their own use 47,328 tons. The quantity of coal transported to home ports during the month was 65,430 tons, and that taken by Japanese vessels for their own use 36,177 tons. This is a total decrease of 12,016 tons from the returns for August.

Tin in Mindanao, P. I.—An American prospector claims to have struck a "mountain" of tin in the Island of Mindanao. Specimens of the ore have been assayed by the geologists of the Division of Mines, Bureau of Science, Manila, and are said to be rich in tin. The close proximity of Mindanao to the tin regions of Malaya should, it is believed, portend tin in quantity in that island.

Coal on the Mongolian Border.—The Chinese Railways Company has discovered, on its property in the vicinity of Hsinminting, or rather just over the Mongolian border, a very rich bed of coal of almost pure carbon (*cannel*). It will be an easy matter to construct a branch line to the area, and just beyond there are known to be rich gold and copper resources. Possibly there are other minerals.

Taiya Iron Mine.—This mine supplies iron ore to the Wakamatsu Foundry. Up to the month of September the quantity of ore sent to Japan was 110,000 tons, and it is expected that when the Hangyang Arsenal, now in course of enlargement, is completed, the demand of that industry combined with the demand of Japan will total 300,000 to 400,000 tons per month. Five steamers are now engaged in transporting the ore to Japan.

Japan's Mining Revenue.—The revenue of the Mining Bureau of the Japanese Government for the present fiscal year is expected to show an increase of -Y-300,000 over last year, when it amounted to -Y-2,170,000. The authorities intend to increase the number of mine inspectors. It is stated that if this plan is carried out the receipts of the bureau will further increase the amount to -Y-2,900,000 or -Y-3,000,000.

Asbestos Beds, Northern Luzon, P. I.—Rich deposits of asbestos covering hundreds of acres and containing hundreds of thousands of tons of the mineral, have been located in the mountains of Northern Luzon. Samples of the asbestos have been examined in the Mining Division of the Bureau of Science and pronounced excellent in quality with not more than from 1 to 2 per cent of alloy. The deposits are inlaid between the layers of asbestos with talcum and silica, both valuable deposits, and the fields of asbestos are within a few miles of excellent harbors.

Mining Industry in Hokkaido.—Since the termination of the war with Russia, the Japanese have revived the mining industry of Hokkaido to such an extent that the Mining Bureau of the Department of Agriculture and Commerce at Tokyo has become congested by the number of applications. Applications for permission to engage in prospecting cover 300,000,000 *tsubo* of territory, while those for the actual working of mines extend over some 110,000,000 *tsubo*. One *tsubo* equals four square yards. There is great variety in the character of mines. They are chiefly gold (quartz and placer), copper, coal and manganese.

Oil Industry of Burma.—The oil industry of Burma is growing rapidly. In 1896-7 the total imports of mineral oils into India from foreign countries were, roughly, 64,000,000 galls., while the exports of Burma oil from Rangoon coastwise were 40,000 galls. In 1905-6, the period ending March 31st, the foreign imports were 51,000,000 galls., while the Burma oil exported to India ports was 47,000,000 galls. In other words, in 10 years the Burma oil exported to the Indian market has increased over a thousandfold. Ten years ago the Burma oil exported to the Indian market was 1-1600 part of the foreign mineral oils received, while in the latter year under consideration the figures were nearly equal.

Shipments of Gold from Australia.—There was a large increase in the shipments of gold from Australia from the beginning of the present year to July 31st, in comparison with those for the corresponding period of 1905, showing an increase of $23,428,275 gold. The shipments compare thus:—

	1905	1906
Melbourne	$ 2,734,992	$10,631,808
Sydney	5,916,997	15,191,188
Brisbane	8,760	———
Adelaide	54,748	875,970
Fremantle	13,321,946	18,766,752
Total	$22,037,443	$45,465,718

Ruby Monopoly, Burma.—During the last year in Burma 1,773,129 trucks of ruby earth were washed, at an average of $1.50 gold per truck. This is less 130,000 trucks than were washed the year previous. This decrease is reported due to the working out of the Choungzone Mine. The output of this mine came from corners and crevices of the rock, which increased the cost of taking out the dirt. Work will soon begin at the Myntada Mine, which is very close to the Choungzone, and will use the same washing machinery without necessitating the removing of it. The royalties received by the Government from native miners during the year amount to $62,975 gold, which is about half what it was in 1904. There was a net profit for the year 1905-6 of about $40,000 gold, and a dividend of 12 cents a share was declared. But for the control held by a few persons over the ruby deposits of Burma, and the disposition to limit the output, rubies would be 50 per cent cheaper than they are on the market today. Burma coal-oil and ruby deposits are held in the tight fist of monopoly, and it looks as if no power would be able to break it.

Federated Malay States Tin.—The following statistics of the tin output from January to July, 1906, inclusive, are published by the Mines Department of the Federated Malay States:—

OUTPUT IN PICULS

Perak	258,277.75	250,060.34
Selangor	170,214.95	154,004.05
Negri Sembilan	48,742.06	44,796.08
Pahang	18,861.01	19,320.86

DUTY IN DOLLARS

Perak	2,751,956.62	2,959,823.45
Selangor	1,838,188.72	1,825,327.79
Negri Sembilan	526,656.58	532,812.33
Pahang	125,714.18	48,617.43

INCREASE OF OUTPUT AND DUTY

Perak	——— piculs	$207,866.83
Selangor	——— piculs	———
Negri Sembilan	——— piculs	6,155.75
Pahang	459.85 piculs	22,903.25

DECREASE OF OUTPUT AND DUTY

Perak	8,217.41 piculs	$———
Selangor	16,210.90 piculs	12,860.93
Negri Sembilan	3,945.98 piculs	———
Pahang	——— piculs	———

SUMMARY OF OUTPUT AND DUTY

7 months 1905	496,095.77 piculs	$5,242,516.10
7 months 1906	468,181.33 piculs	5,466,581.00
A decrease of	27,914.44 piculs	———
An increase of	——— piculs	224,064.90

FINANCIAL AND MISCELLANEOUS

American Consulate at Kiaochow.—An American Consulate has been opened at Kiaochow, China.

Hokkaido Colonial Bank.—This bank has decided to increase its capital from -Y-3,000,000 to -Y-5,000,000.

Tobu Railway Company.—This company has notified the issue of a loan of -Y-1,500,000 at 6 per cent *per annum*.

Hiogo Gas Company, Ltd., Kobe.—This foreign concern has disposed of its business to the Kobé Gas Company, Ltd., a Japanese company.

Sugar Refineries Amalgamate.—The Japan Sugar Refinery Company and the Osaka Sugar Refinery Company have amalgamated their business.

Coinage in Japan.—During September -Y-20 gold pieces to the amount of -Y-4,900,000 and 20-*sen* silver pieces to the value of -Y-990,601 were struck at the Osaka Mint.

Japan Share Market.—The share market of Japan is again very active, spinning and other stocks generally rising. This activity is ascribed to the depression in the demand for money.

Arnhold, Karberg & Co.—It is announced that Messrs. Arnhold, Karberg & Co. have removed the offices of their Berlin branch from 75, Unter der Linden, to No. 7, in the same street.

Ex-Seoul-Fusan Railway Company.—At a recent general meeting of the shareholders of the ex-Seoul-Fusan Railway Company, held in Tokyo, a dividend at the rate of 6 per cent *per annum* was declared.

Fixed Bank Deposits, Japan.—The leading banks of Osaka and Kobé have agreed to lower the interest on fixed deposits to 5 per cent. Interest on current and special currency amounts remains unchanged.

Proposed Sugar Monopoly, Japan.—It is reported that the Department of Finance at Tokyo has decided to abandon the proposed scheme of making the sugar refinery industry of Japan a Government monopoly.

Osaka Sugar Refining Company.—The directors of the Osaka Sugar Refining Company have resigned in a body in consequence of the disagreement with shareholders regarding the heavy loss sustained on the last half year's working.

Honan-Ningpo Railway.—The Honan-Ningpo Railway has decided to raise a domestic loan by October next year, and repay the £700,000 which was defrayed by the British-Chinese Corporation for the construction of the line.

Artesian Well Towers and Tanks, Bangkok.—Messrs. Howarth Erskine, Ltd., of Singapore have received orders from the Siam Government for the construction of two steel towers with tanks, to be erected over artesian bores at Bangkok.

Chinese Emigration to Canada.—The $500 gold Canadian tax on Chinese immigrants is causing a scarcity of unskilled labor at Victoria, B. C. The salmon canners there are petitioning for a reduced head tax, in order to permit Chinese to enter the province.

Japan's Bamboo Trade:—The Japanese foreign trade in bamboo and bamboo work, particularly with the United States, has been extremely active during the last three months, large orders being placed at prices considerably higher than those of a year ago.

British Mails to Hongkong.—The Canadian Pacific Railway Company is boasting that it has accomplished the feat of landing British mails in Hongkong in 29 days from their dispatch from London, or nearly a week less than the previous record.

Hongkong Government's Typhoon Losses.—It is estimated that the damages suffered by the Government of Hongkong during the recent typhoon will amount to at least $125,000. This is a very small amount as compared with the damages sustained by private firms and individuals in the colony.

Hokkaido Hemp Company.—This company has increased its capital from -Y-1,200,000 to -Y-2,400,000, for the purpose of improving the looms of its manufactory and establishing factories in the vicinity of Tokyo. The new shares will be distributed among the present stockholders *pro rata*.

Kobu Railway Transfer.—A general meeting of the Kobu Railway was held recently at Tokyo, and the chairman announced that the price of the transfer of the line to the Government was roughly estimated at -Y-13,200,000. The directors were appointed to be administrators after the nationalization of the railway.

Rubber Promotion, Malaya.—A company has been founded at Amsterdam with a capital of 3,000,000 Dutch gulden, to undertake the cultivation of rubber in the Malay Peninsula. The name is *La Société Anonyme des Plantations réunies d'Hevea des Terres de Bila*, and the promoters are the Banque de L'Union Parisienne.

Otaru Lumber Company.—At the organization meeting of this company in Tokyo, Baron Shibusawa, the chairman, nominated the following directors and auditors:—Directors, Messrs. S. Tanaka (Managing), K. Okura, C. Uyemura, T. Hayakawa and K. Yamashita; auditors, Messrs. Asaba, W. Sekiya and C. Matsumoto.

Sumatra and Borneo Tobacco.—The import of Sumatra tobacco into the United States for the first seven months of the current year amounts to 28,033 bales against 29,394 in 1905, and 27,565 in 1904. A noteworthy feature of Borneo's tobacco trade for the same period was the purchase of her tobacco for the first time in America.

Tobacco Crop of Japan.—The weather in Japan has been very favorable for the tobacco crop this year and the growth of the plants is very satisfactory throughout the empire. The total harvest is estimated at 12,839,980 *kwamme*, or 106,571,800 lbs., and the net profit to the Government monopoly office -Y-32,000,000, or approximately $16,000,000 gold.

TOKYO ELECTRIC COMPANY.—This company, it is reported, is about to increase its capital from -Y-400.000 to -Y-1,600,000, and to extend its operations to manufacturing electric gloves as well as other electric apparatus, with the assistance of the General Electric Company of America, in order to supply these articles both at home and abroad in the Far East.

FORMOSA'S FOREIGN TRADE.—Formosa's total imports for the calendar year 1905 amounted to $12,223,855 gold and exports to $12,183,323, an increase of $1,350,695 in imports and $823,987 in exports over those of 1904. Of imports $5,481,939 gold were foreign products and $6,741,917 the produce of Japan. The exports to foreign countries were valued at $5,352,573 gold and to Japan $6,830,750.

HOKKAIDO COLLIERY RAILWAY COMPANY'S LOAN.—The *Japan Chronicle* says that the foreign loan of -Y-1,-000,000 raised by the Hokkaido Colliery Railway Company has been invested in both branches of the company's business—the colliery and railway. The Government and the company will be jointly responsible for the loan after the purchase by the former of the company's railway business.

ZINC SMELTING WORKS, JAPAN.—A zinc smelting works is to be established in Japan. Experts will be invited from Europe, and the factory will be built in the neighborhood of Tokyo. The capacity of this works is to smelt 50 tons of zinc ore a day and the capital is to be -Y-3,000,000. The principal idea of the promoters is to find markets in China and Korea. Up to the present time all the zinc ore has been exported.

SIAM'S TEAK INDUSTRY.—The teak industry of Siam is being interfered with by the stealing of elephants. The teak trade there is practically monopolized by four firms, three British and one Danish, and large numbers of elephants are employed in the forests in shifting the logs. These huge beasts are big propositions for kidnapping, yet three firms report the loss in 1905 of 33 animals, worth $35,000 gold. Recovery of a stolen animal is rare.

CHINA'S NEW CANNING INDUSTRY.—A larger import of tin plates by China is accounted for by the establishment at Kiungchau (Hoihow) of a native cannery, which is going to pack lichees and pineapples in tins for export during the coming season. A considerable stock of tins has already been manufactured locally, and, to judge from appearances, they are little, if at all, inferior to those turned out by the large foreign canneries, though the process is somewhat primitive and laborious.

PROVINCIAL BUILDINGS, PHILIPPINE ISLANDS.—The Philippine Commission has appropriated the following sums of money as loans to the respective provinces for the construction of Government buildings:—Province of Albay, ₱35,000; Province of Tayabas, ₱60,000; Province of Rizal, ₱75,000, and Province of La Laguna, ₱60,000. It is understood that all this work must be let by public contract and that reinforced concrete will be the material used in the construction.

METHODIST EPISCOPAL CHURCH, MANILA.—R. M. Loper has secured the contract for the construction of a large reinforced concrete edifice for the Methodist Episcopal congregation of Manila. It will be the largest Protestant church in the Islands, and when entirely completed will cost ₱75,000. It is intended for the native branch of the denomination and will have a seating capacity of 1,400. The extreme dimensions will be 82x93′. There will be a gallery on three sides of the auditorium, with a seating capacity of 500.

MACHINE TOOLS IN CHINA.—In the past there has been a small demand in China for high grade tools for iron working, but the Chinese are stirring themselves. Mining is being carried on as never before. A great steel plant is in operation at Hankow, from which pig iron is being shipped to Mexico, and quantities are being shipped to Japan constantly. The company is arranging to complete the plant, so that it will be capable in the future of turning out 1,000 tons of steel per day. In a few years, with the aid of the railways, China is bound to become a very large market for machine tools of all kinds.

HEAVY SILVER PURCHASES BY INDIA.—Early in June the Indian Government announced that henceforth the $52,000,000 gold reserve fund, which is now mainly held in London in securities, would be called the gold-standard reserve fund. Silver purchases have since been large, and it is understood that, as the Government intends in future to hold a much larger stock of silver at all times than it has in the past, there may be gradually accumulated a surplus stock of about 10,000,000 rupees (rupee, 32 cents gold), upon which it will draw only in case of emergency when its otherwise large purchases would cause an undue advance in the price of the metal. Through the accumulation of large surplus reserves in silver the Indian Government will be enabled to carry out a policy of conducting its purchases regularly over the whole 12 months, thus avoiding the necessity of buying during periods of active trade.

MANILA RAILWAY SHARES.—The issue of the recent circular (published in the October number of THE FAR EASTERN REVIEW) respecting the Manila Railway has made the 6 per cent debentures rise, without any particular business. Debenture stockholders have not received any interest for 15 years, though their rights have been preserved, both in respect to capital and the arrears of interest, which amount to 90 per cent. If they insist on their pound of flesh, there is no reason why they should not maintain their present interest of 6 per cent, and demand the capitalization of their arrears at the full face value, as the consideration for transferring the line to an American corporation (the Manila Railroad Company). However, suggests a contemporary, the situation lends itself to a reasonable compromise, and a way out of the difficulty may be found by replacing the present 6 per cent debentures by 4 per cent bonds, giving holders £190 of these for every £100 old stock. These *fours* should easily earn their full interest, and be worth, say, 80 per cent, equivalent to £152 for each £100 of present stock. Certainly the debenture holders will be foolish to accept illiberal treatment, after exercising so much patience.—*The London and China Express.*

CHINESE ENGINEERING AND MINING COMPANY, LTD.—The annual general meeting of this company, the head offices of which are at Tientsin, was held in London, October 26th, 1906, when the directors' report and accounts for the financial year ended February 28th, was submitted. According to this report the net result of the year's transactions shows a balance to the credit of profit and loss account of £142,646, made up as follows:—Net profit, after providing for all charges in China, £178,580; add balance brought forward from last year (£8,199) and gross receipts in London (£4,268)—total £12,467—the total net profit is £191,047. Deduct expenditures in Europe, for salaries, stores, etc. (£6,368), interest on debentures (£25,783), redemption of debentures (£10,000); directors' fees (£3,230), and legal expenses estimated at £3,000—total £142,646—leaves a net balance of £142,646. The directors recommended the appropriation of this sum as follows:—To reserve for depreciation (making a total reserve of £110,000), £30,000; payment of final divident of 1*s* 0*d* per share (free from tax) payable November 2d, 1906, £50,000 (making a dividend of 10 per cent for the year with the interim dividend of 1*s* per share, paid May 1st, 1906, £50,000); carrying forward to new year's account £12,646.

NOTIFICATION

TENDERS will be received at the office of the undersigned until 12 o'clock on Saturday, February 10th, 1907, for the construction of a reinforced concrete wharf 1170 feet in length, containing approximately 150,000 lineal feet of reinforced concrete piling, and 180,000 cubic feet of superstructure; four reinforced concrete 4-storey godowns, each 300 feet by 100 feet; a transit shed, and other works.

PLANS, SPECIFICATIONS AND OTHER INFORMATION for those desiring to tender will be ready on December 10th, 1906.

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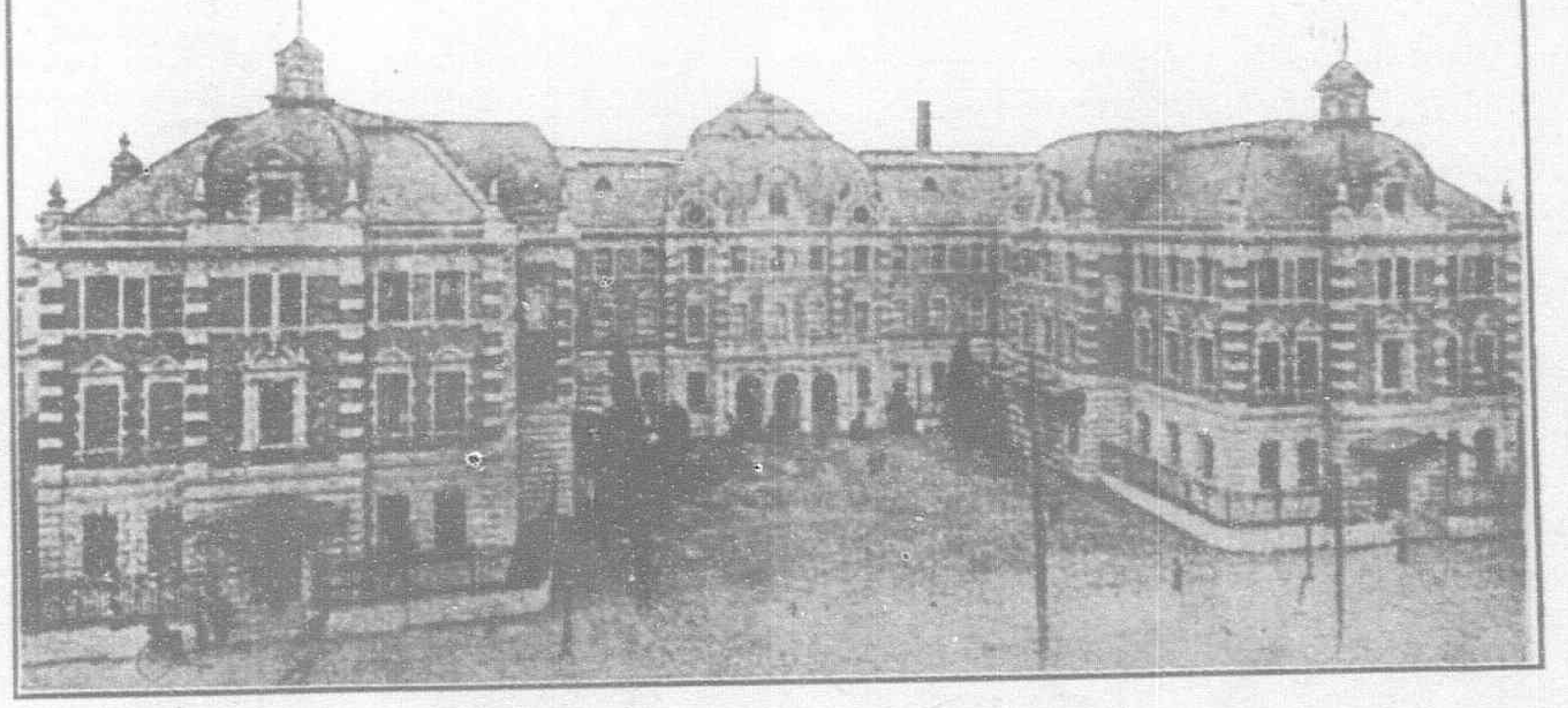

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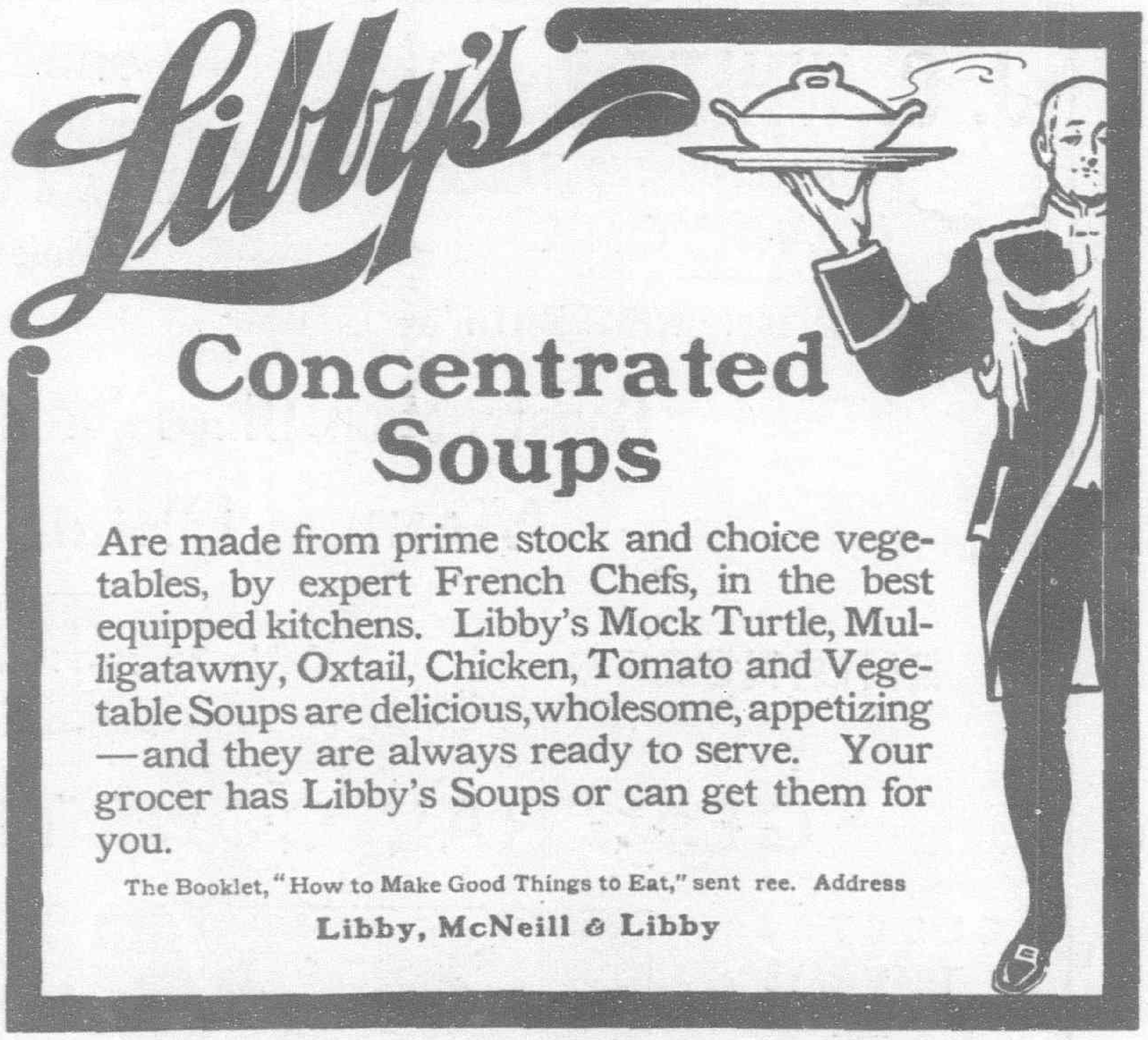

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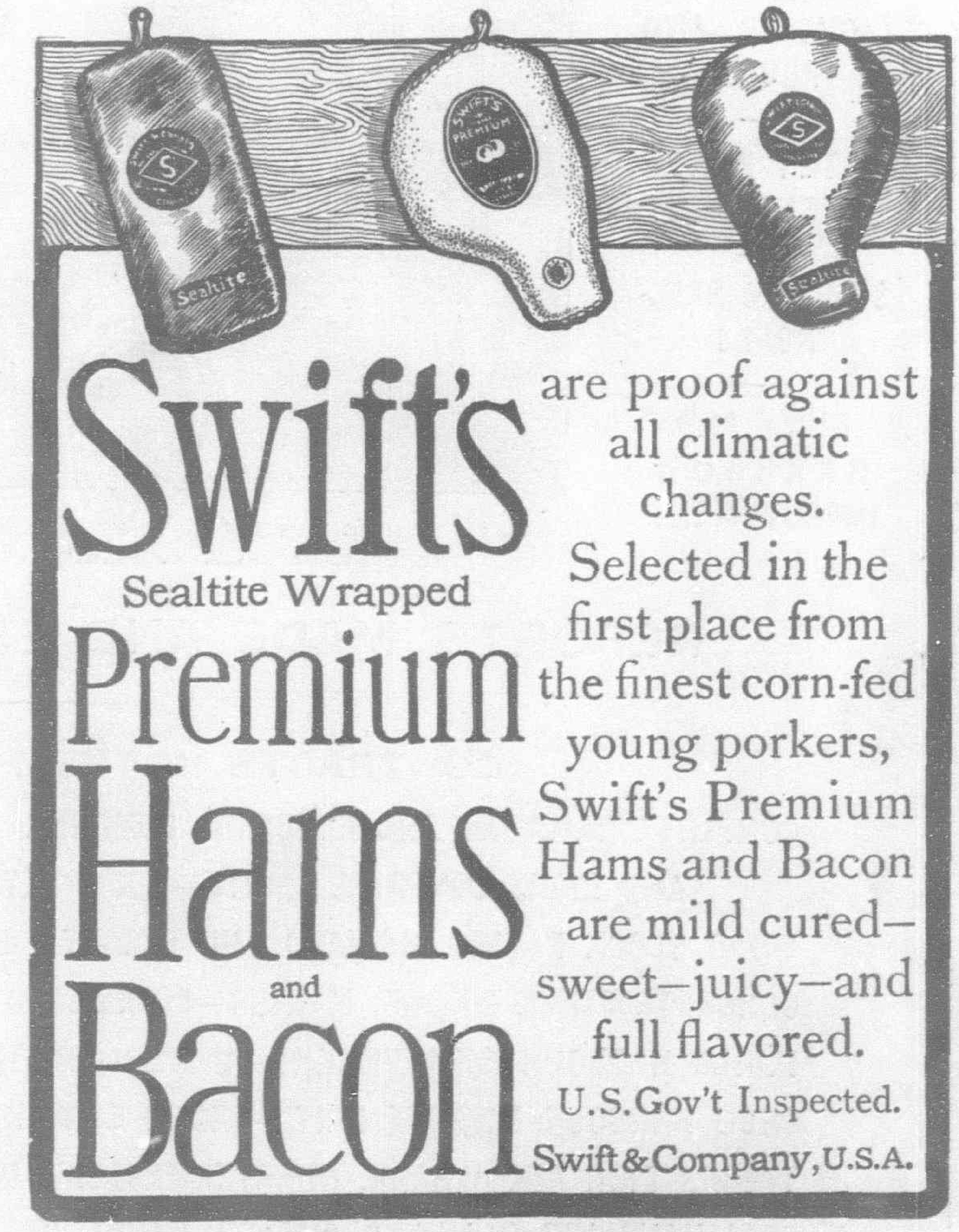

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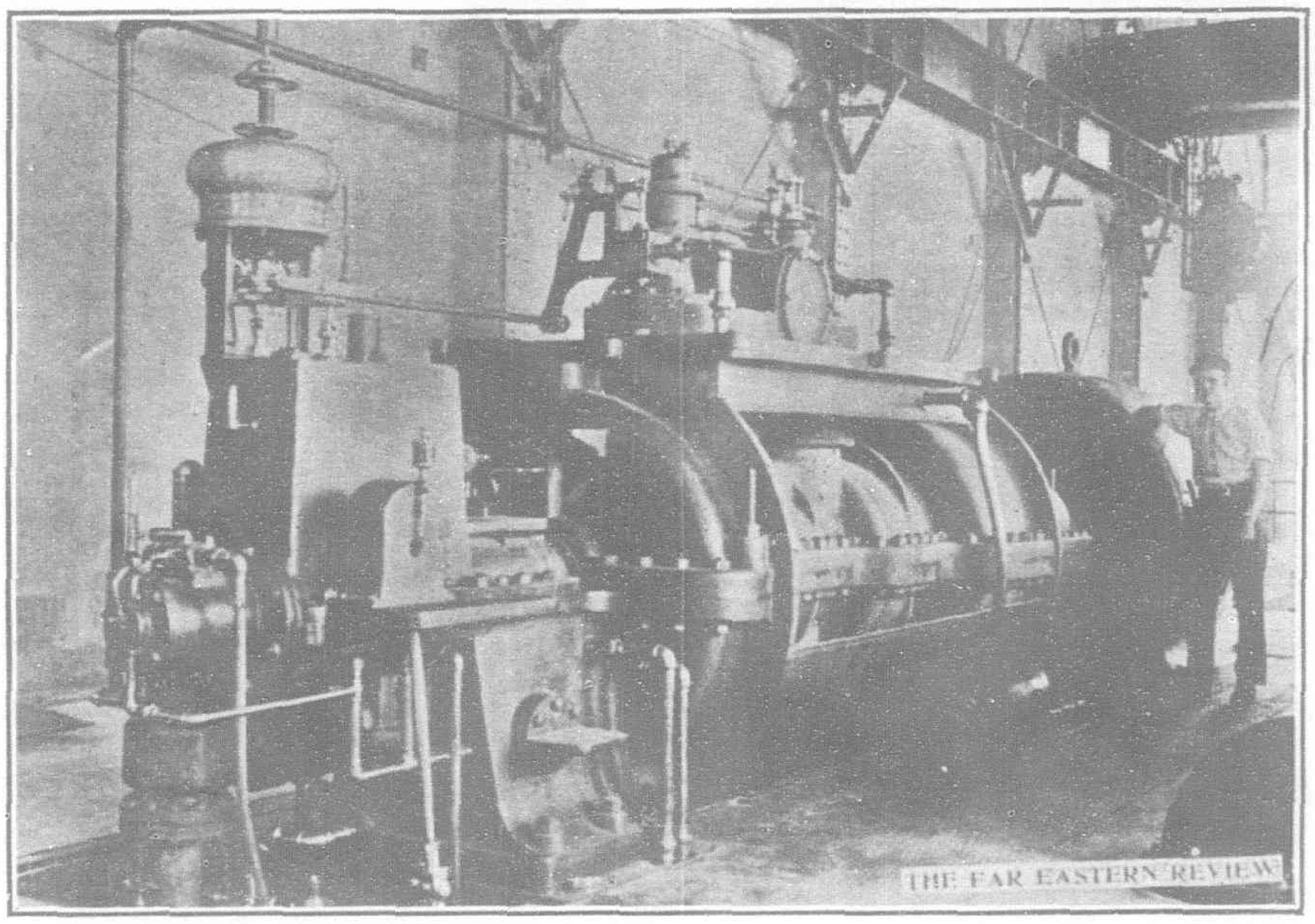

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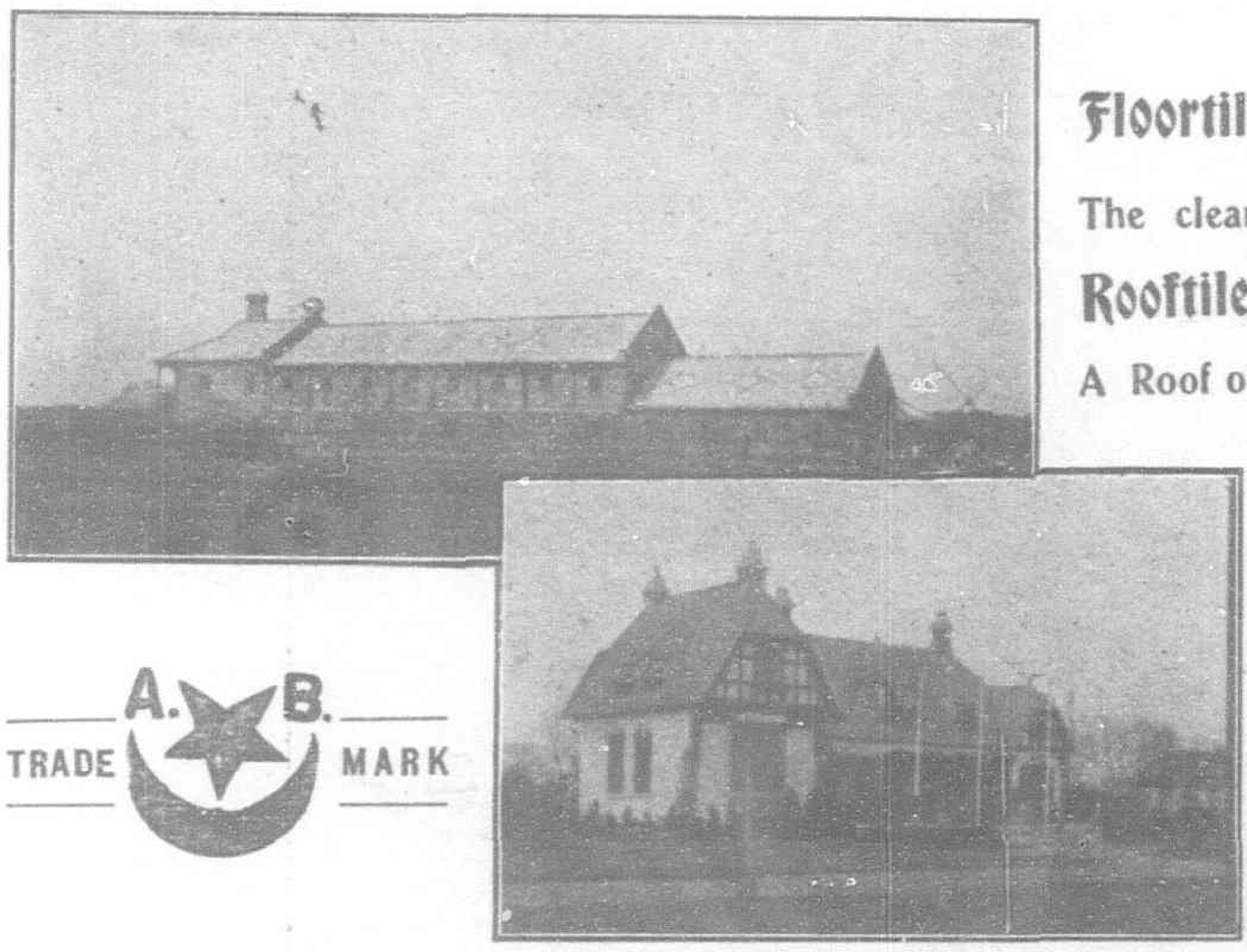

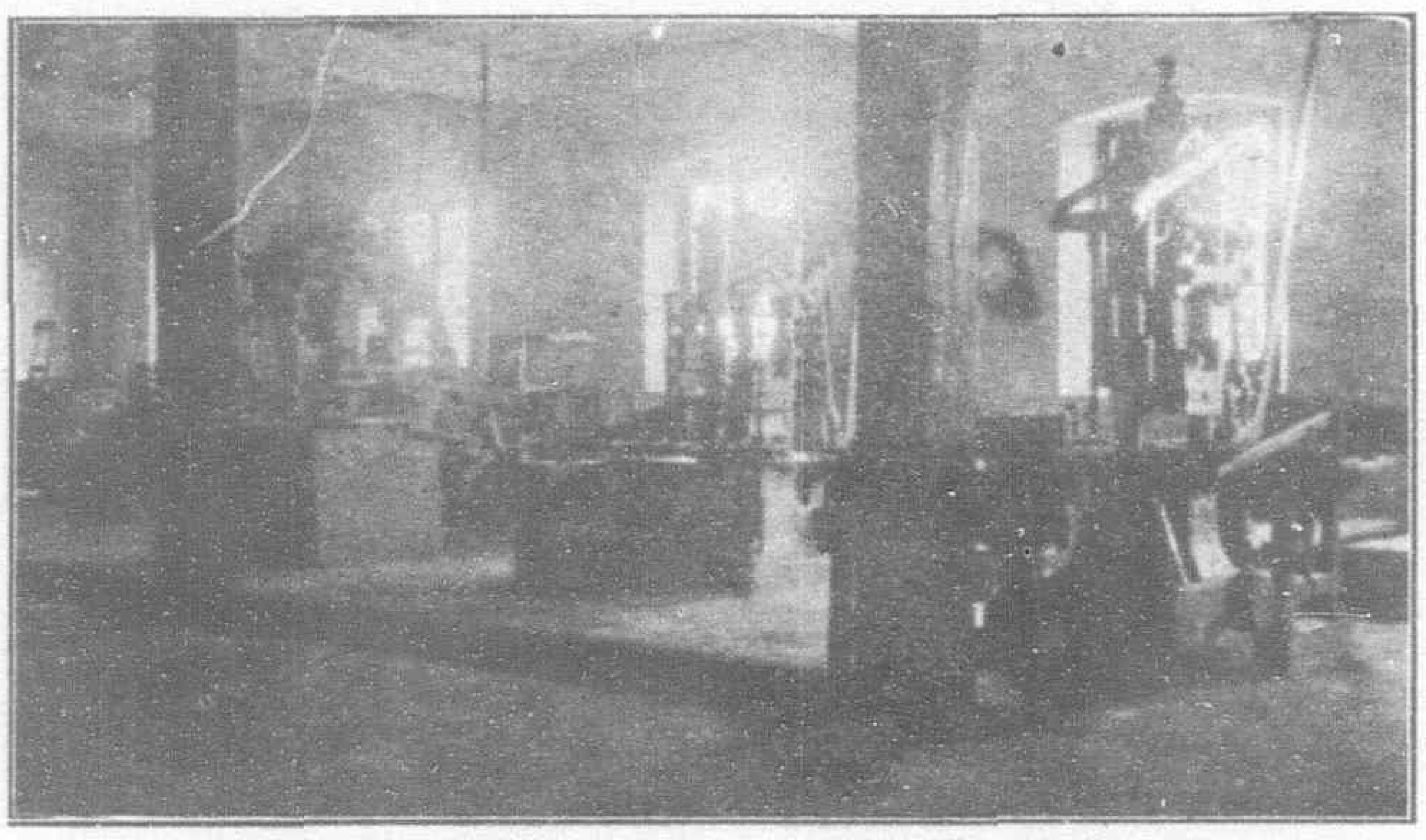

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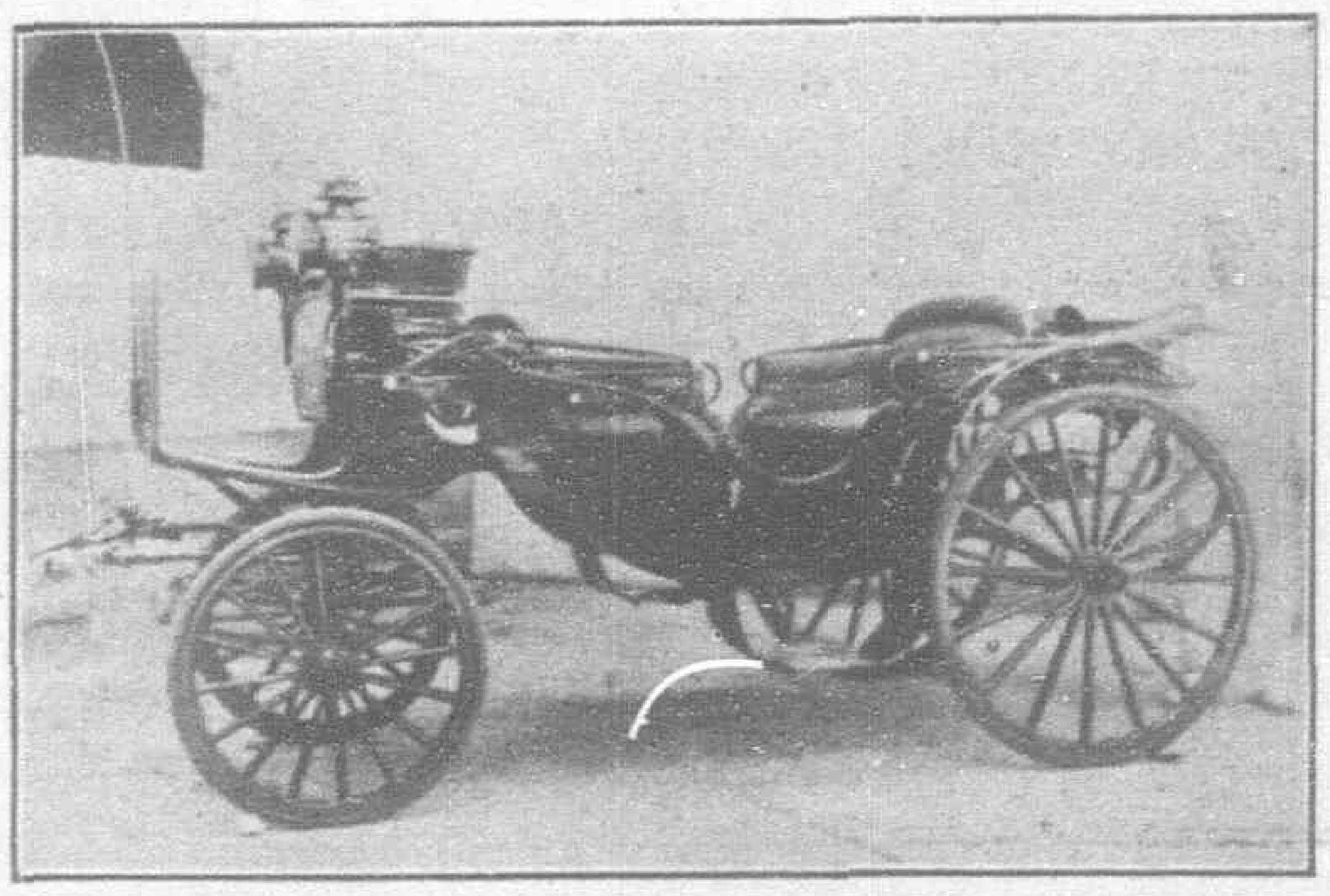

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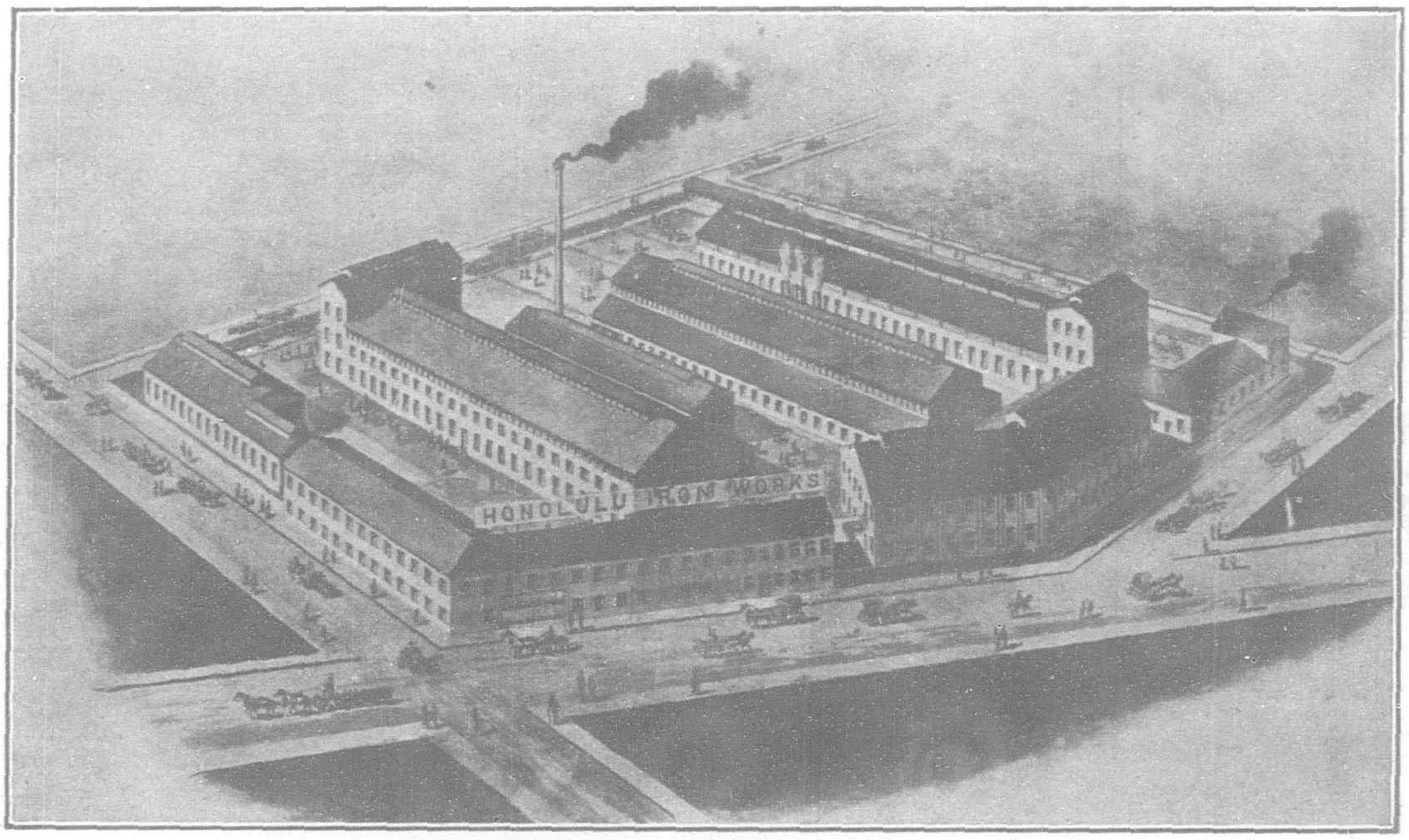

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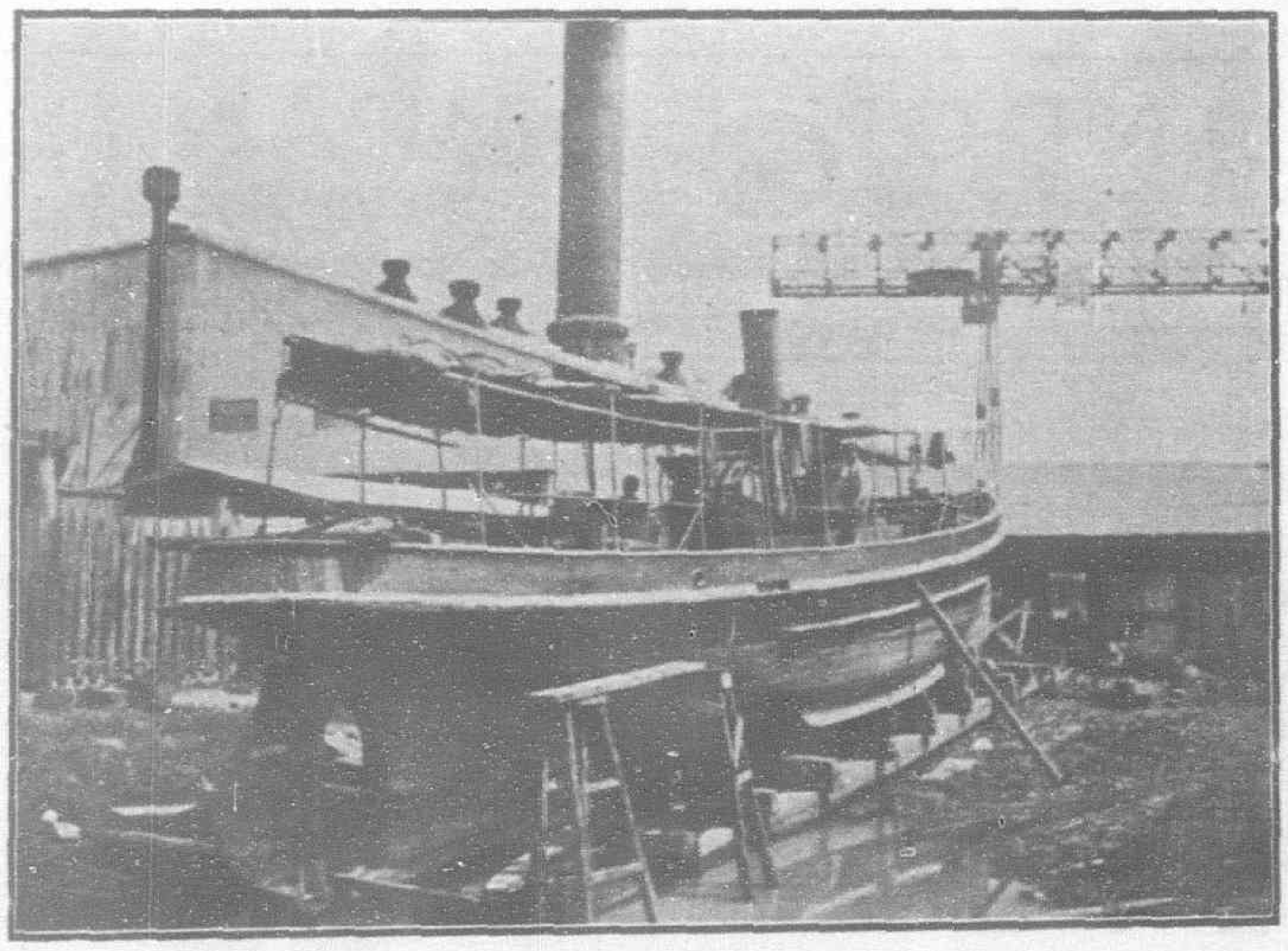

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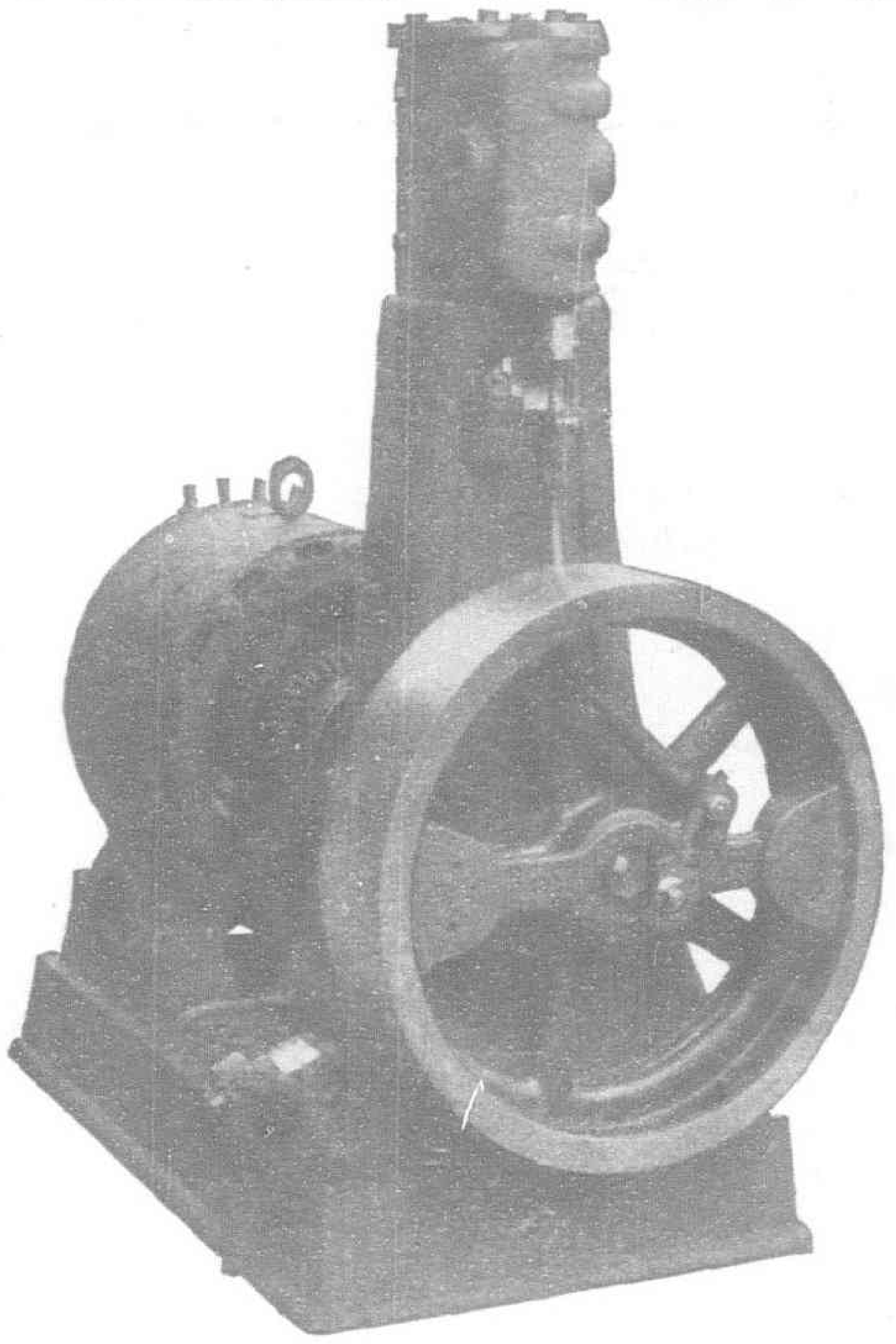

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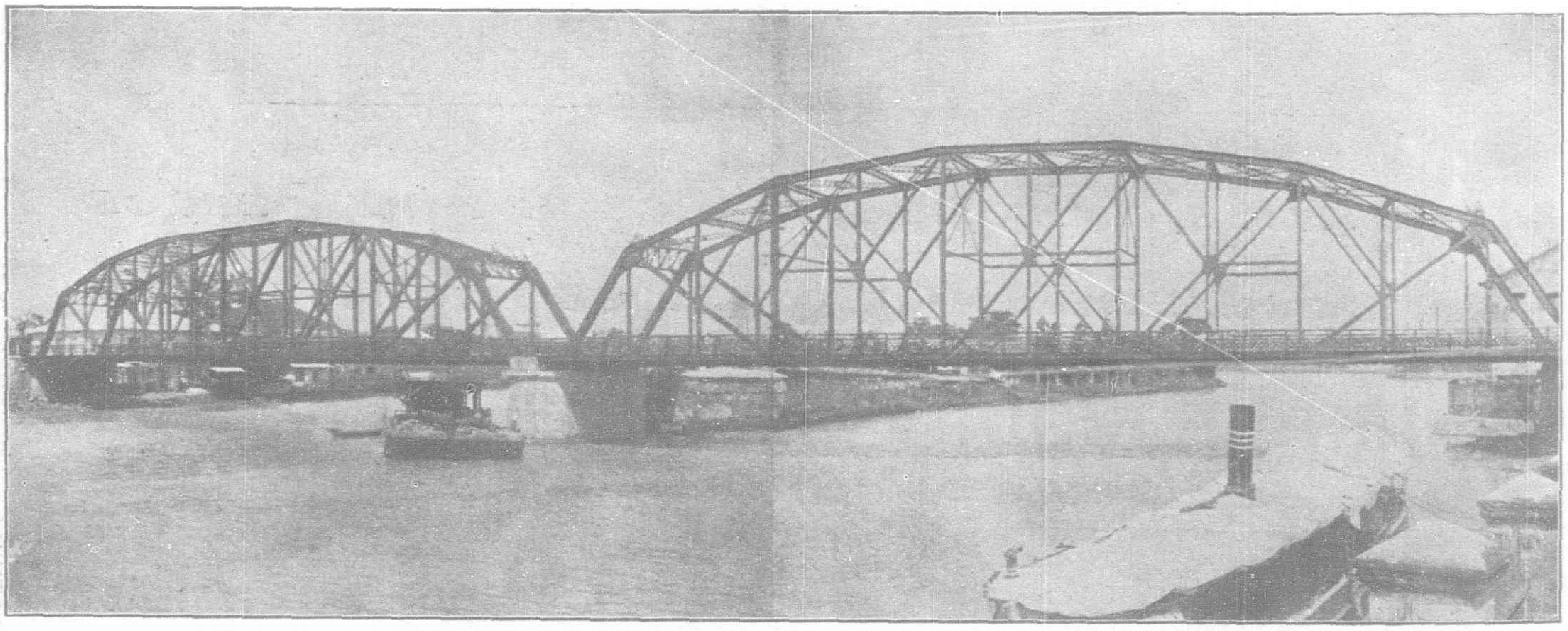

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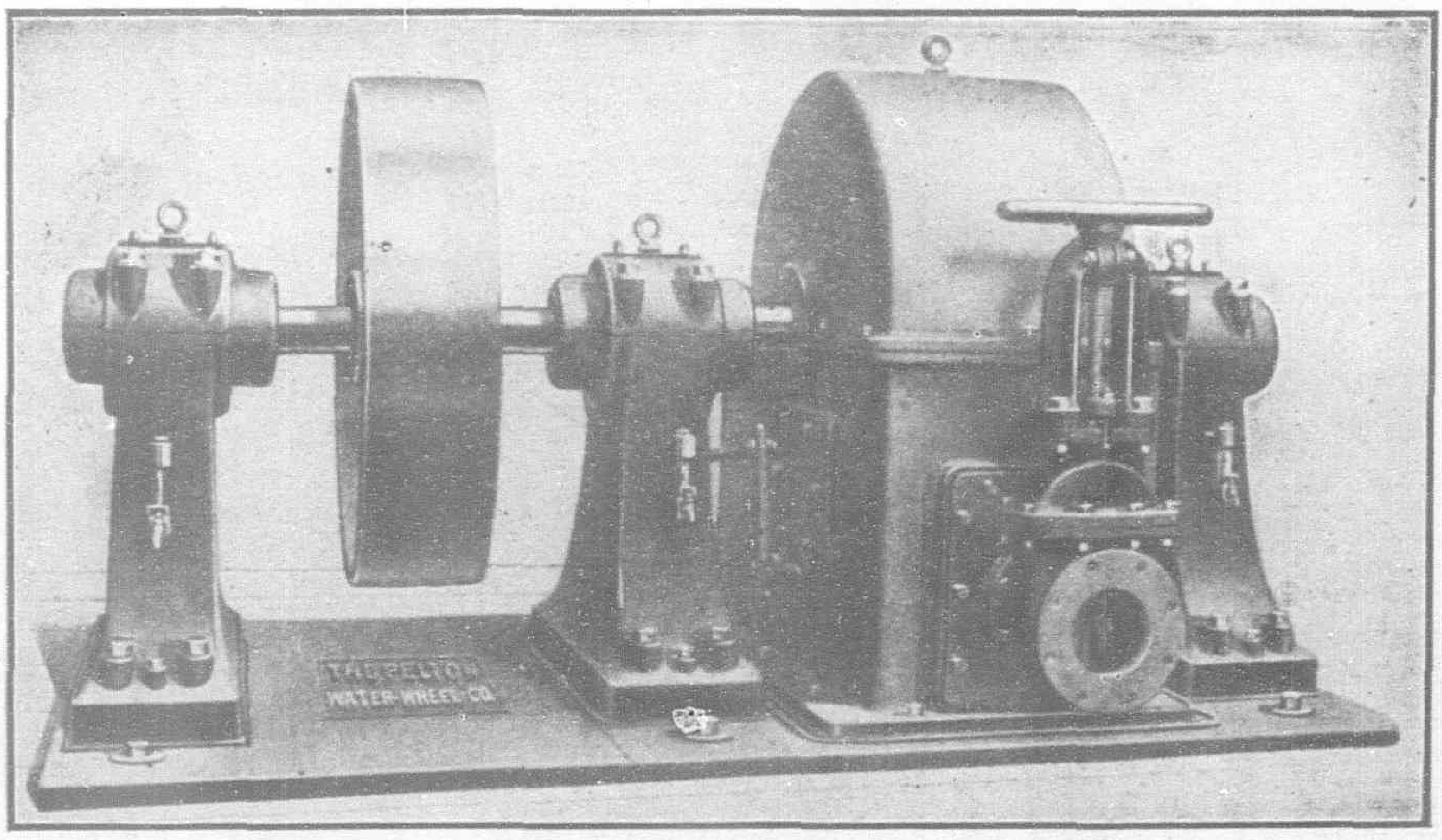

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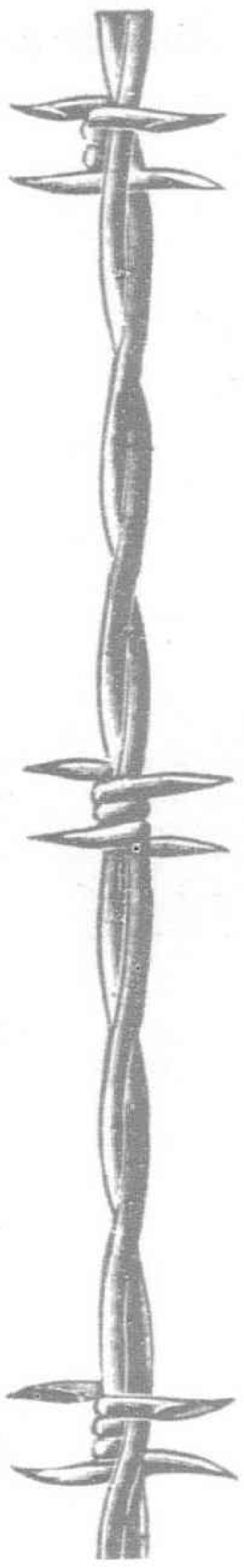

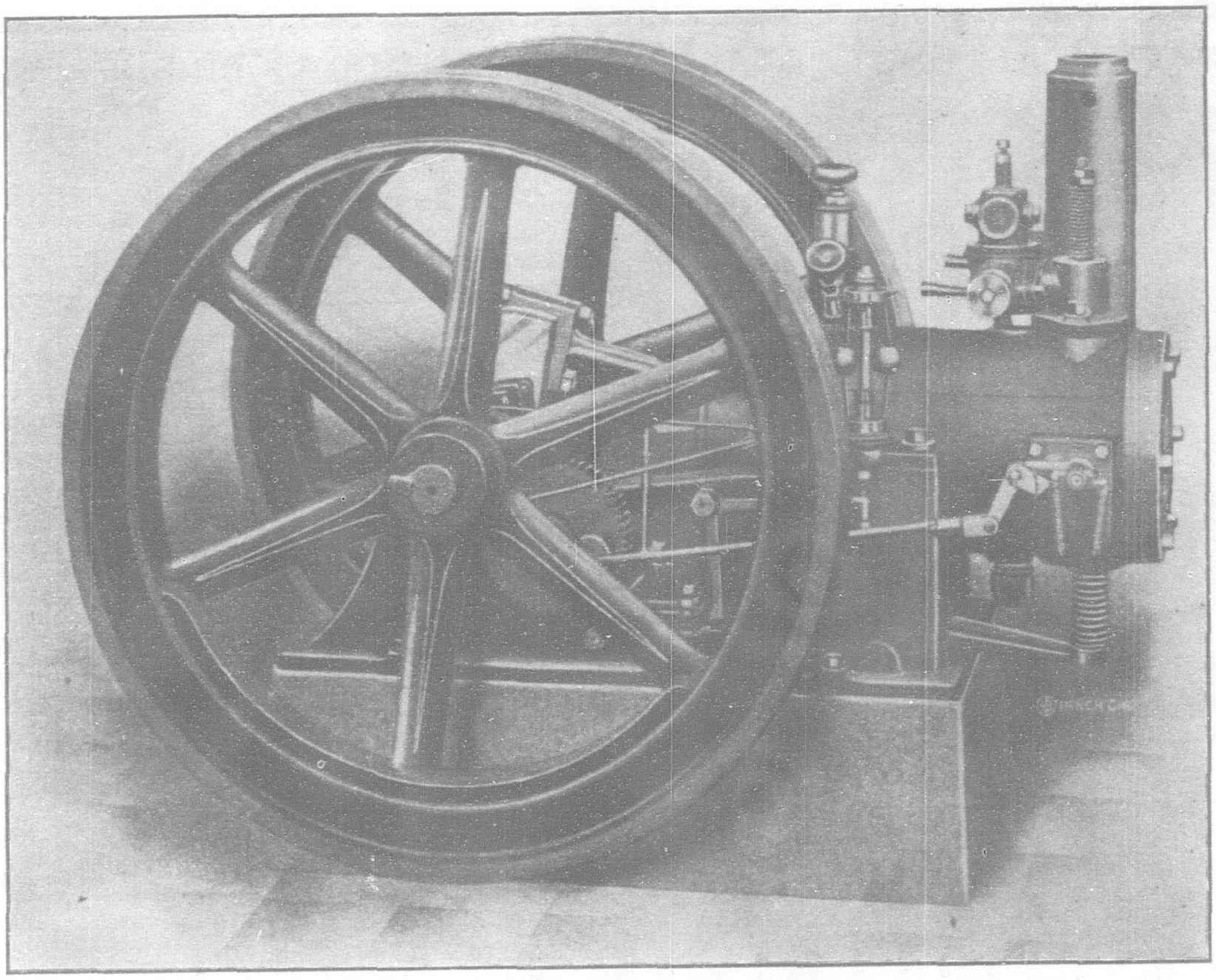

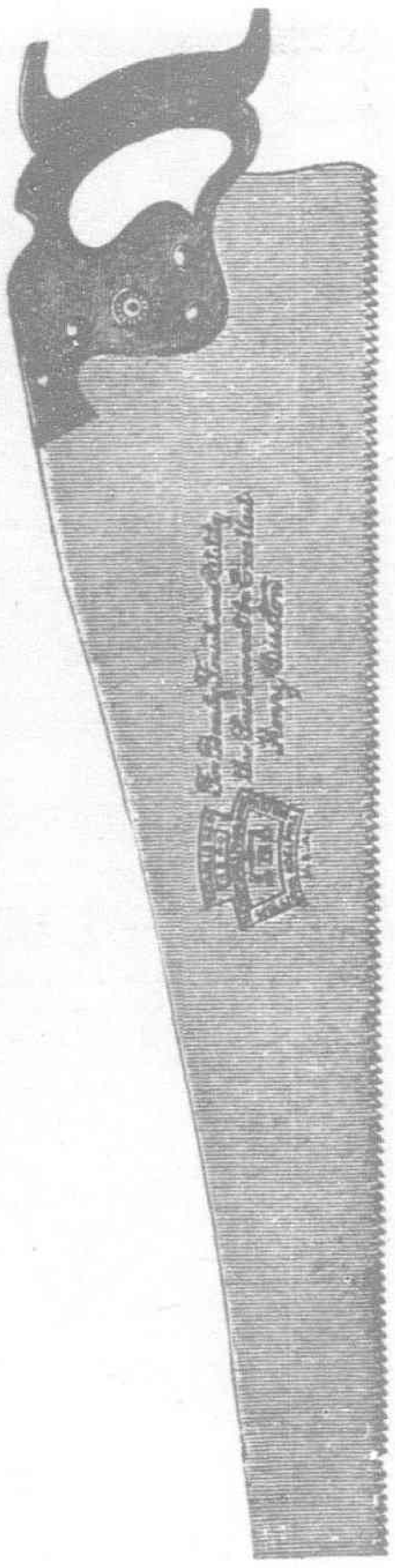

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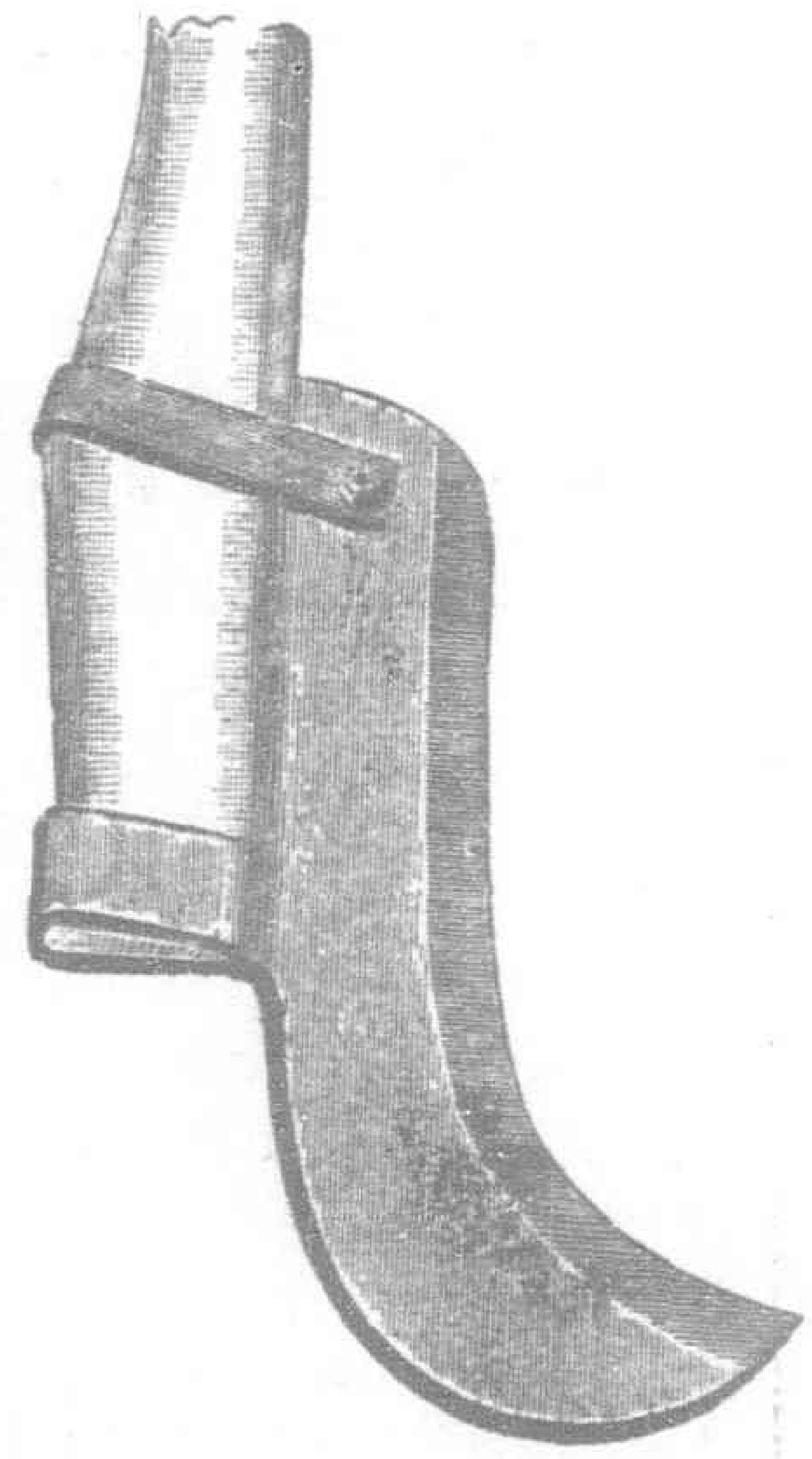

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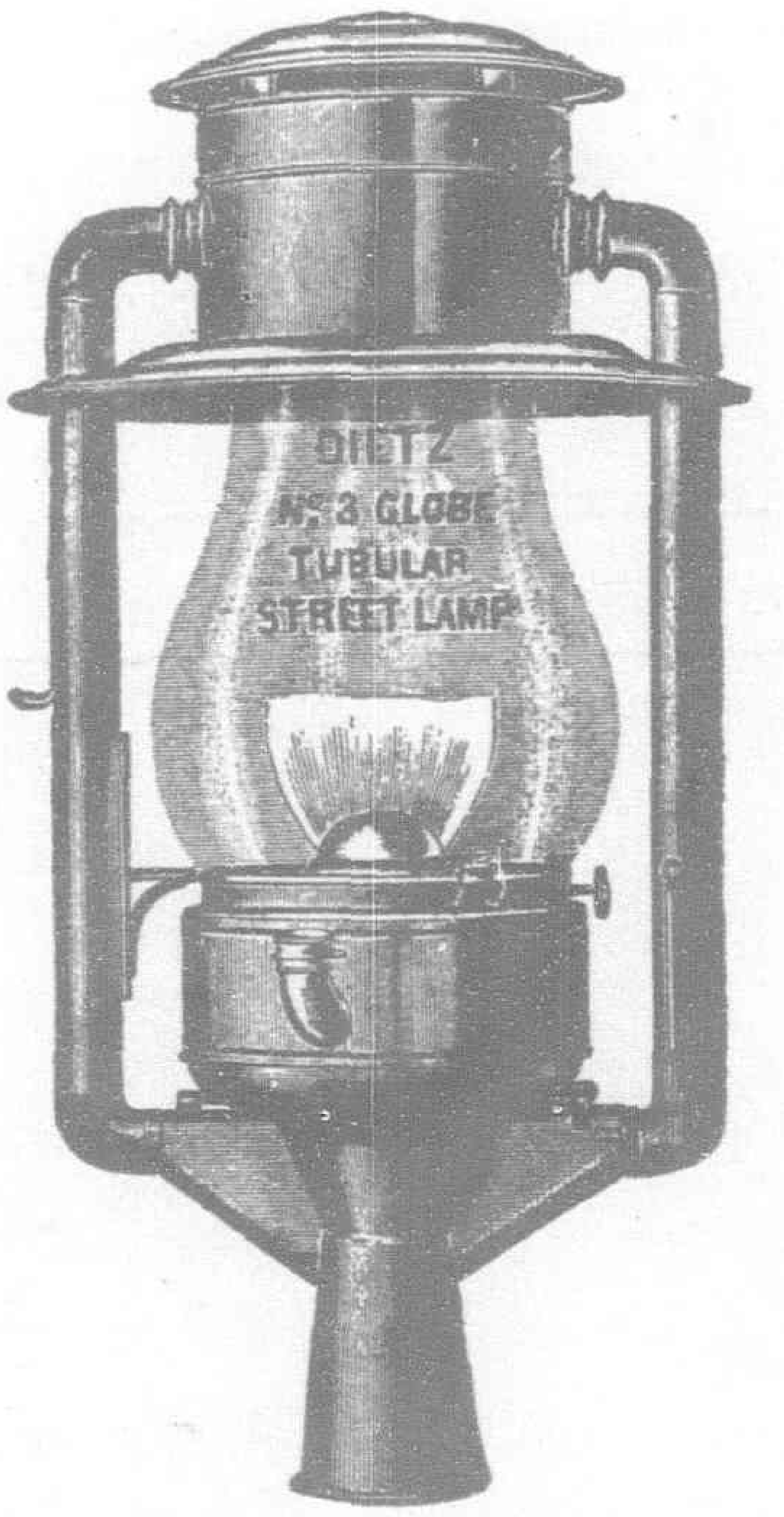

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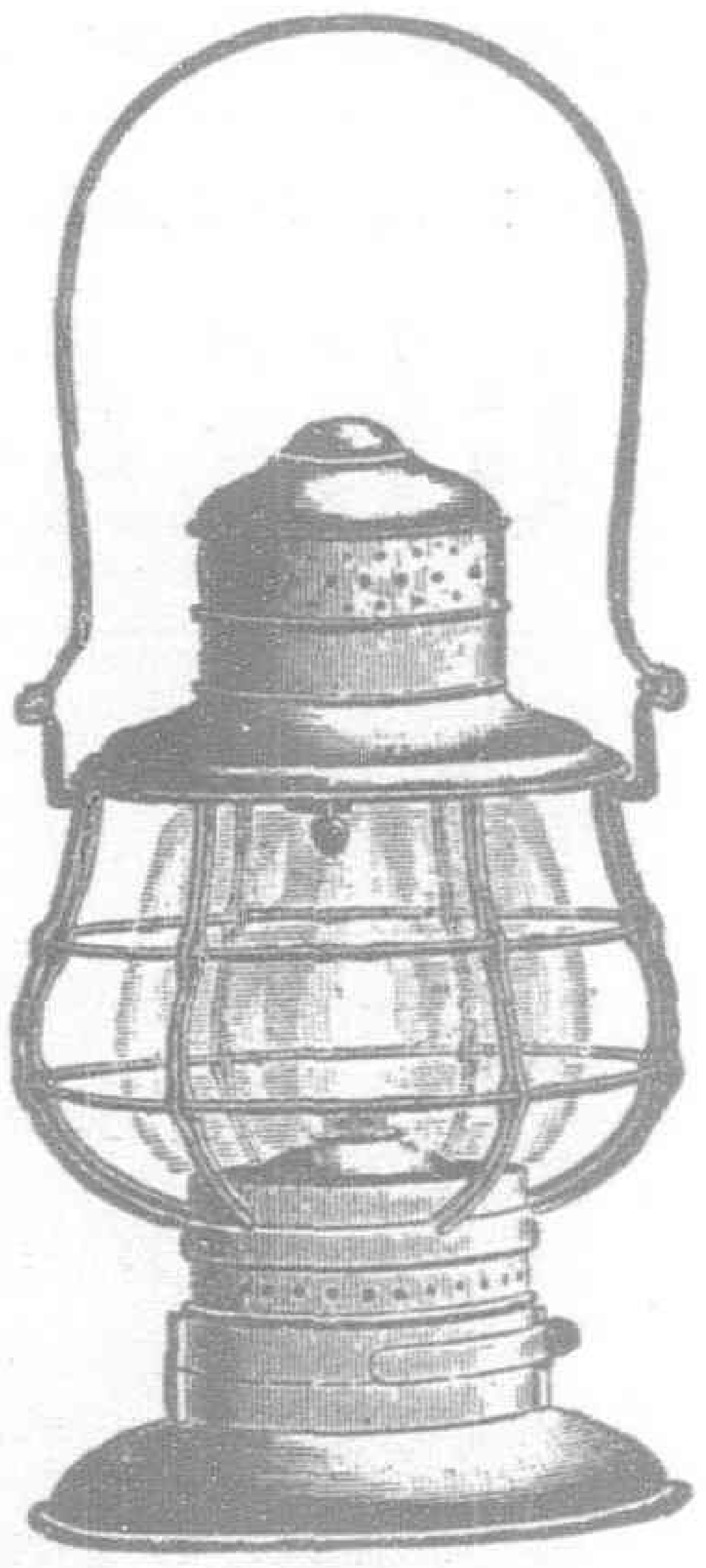


CABLE ADDRESS:
"HOOPTON"

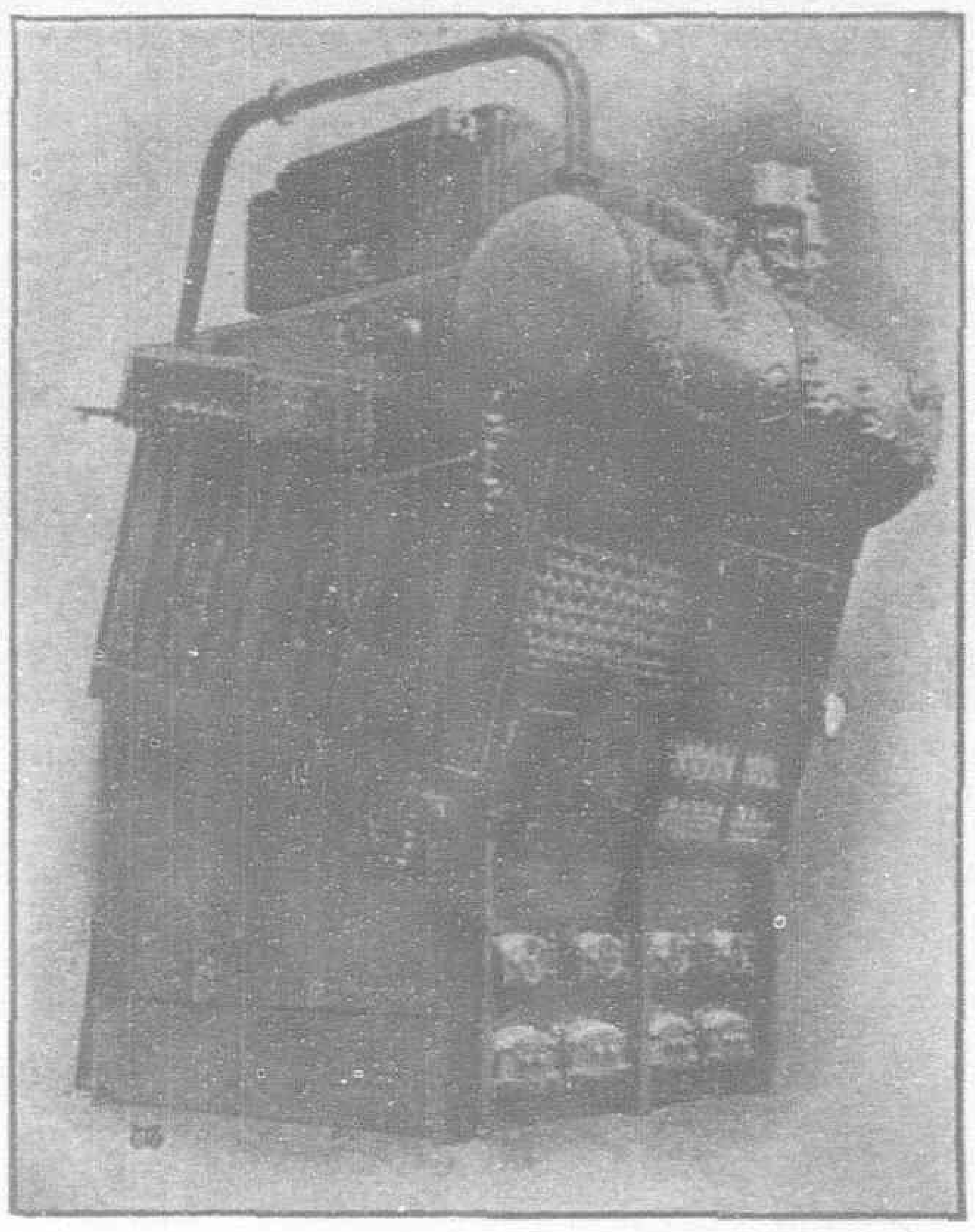
Codes: Western Union, A. B. C.,
A No. 1, Lumberman's, Hannify's

California-Manila Lumber Commercial Co.

MANILA, P. I.

New Wholesale and Retail Store 32 Plaza Moraga

BABCOCK AND WILCOX, LTD.

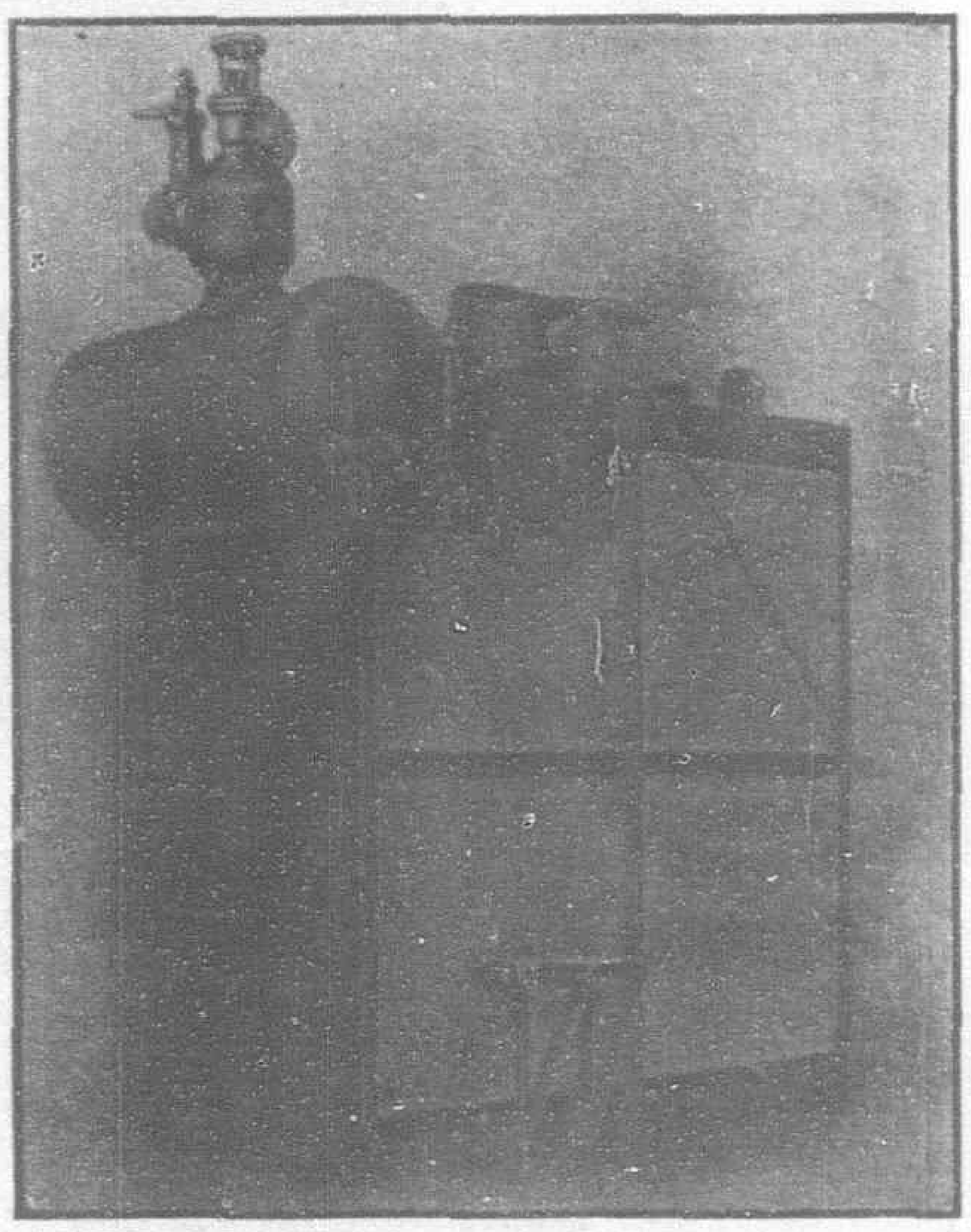


MARINE TYPE FOR LAND PLANTS

PATENT WATER-TUBE STEAM BOILERS

5,000,000 H. P. IN USE

Some installations in China:—
Electric Light Works, Hongkong.
Green Island Cement Works, Hongkong.
Green Island Cement Works, Macao.
China Light and Power Co., Canton.
Municipal Electric Light Works, Shanghai.
Electric Light Works, Tientsin.
Electric Light Works, Pekin.
Electric Light Works, Hankow.
Pekin Syndicate Mines, Takoo.
S. Pearson and Son, Ltd., Railway Works and many others.



PORTABLE TYPE, REAR VIEW

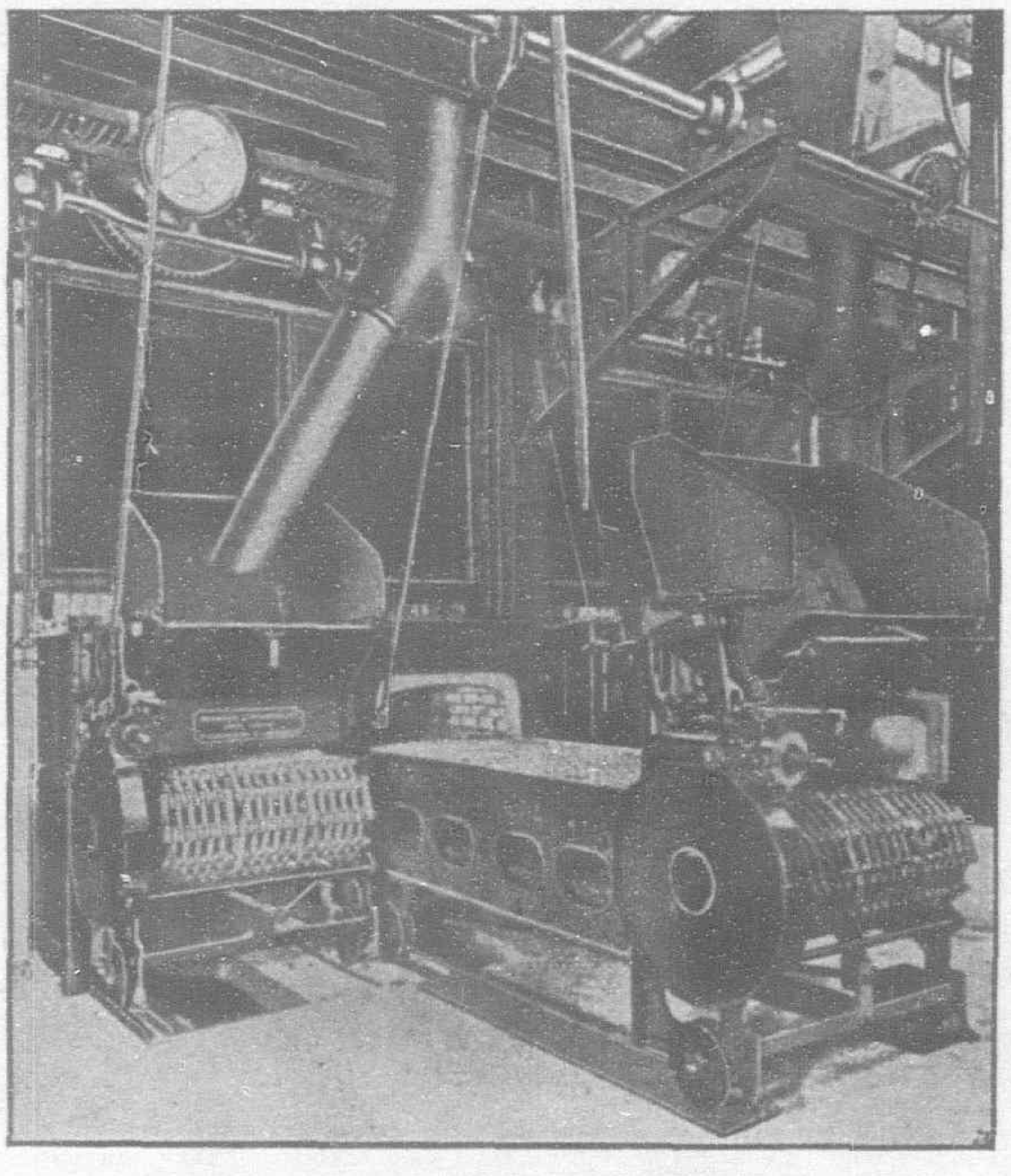
Superheaters.
Feed-Water Heaters.
Economisers.
Steam Piping.
Steel Chimneys.
Water Purifiers and Softeners.
Coal-Conveying Machinery.
General Boiler-House Accessories.

Patent Chain Grate Mechanical Stokers

SMOKELESS COMBUSTION and **HIGH EFFICIENCY** with Bituminous Coal. Continuous Working, Low Cost of Upkeep, Self-Clinkering and Easy Manipulation.

Extract from 1904 Report of F. H. W. Aldridge, Municipal Electrical Engineer of Shanghai:

"It will be learnt with pleasure that the operation of the **MECHANICAL STOKERS** in the new Boiler (B. & W.) has so far successfully overcome the smoke nuisance. With this boiler working the emission of black smoke from the chimney shaft is entirely absent, only a thin white vapour at times being visible."



MANCHESTER CORPORATION ELECTRICITY WORKS, STUART STREET

Patent Portable Boilers

Specially constructed for use in mountainous districts, and shipped in small packages of light weight, no parcel exceeding two hundred lbs. in weight for easy transport by Cart, Coolies or Mule-back.

Cross Type Boilers

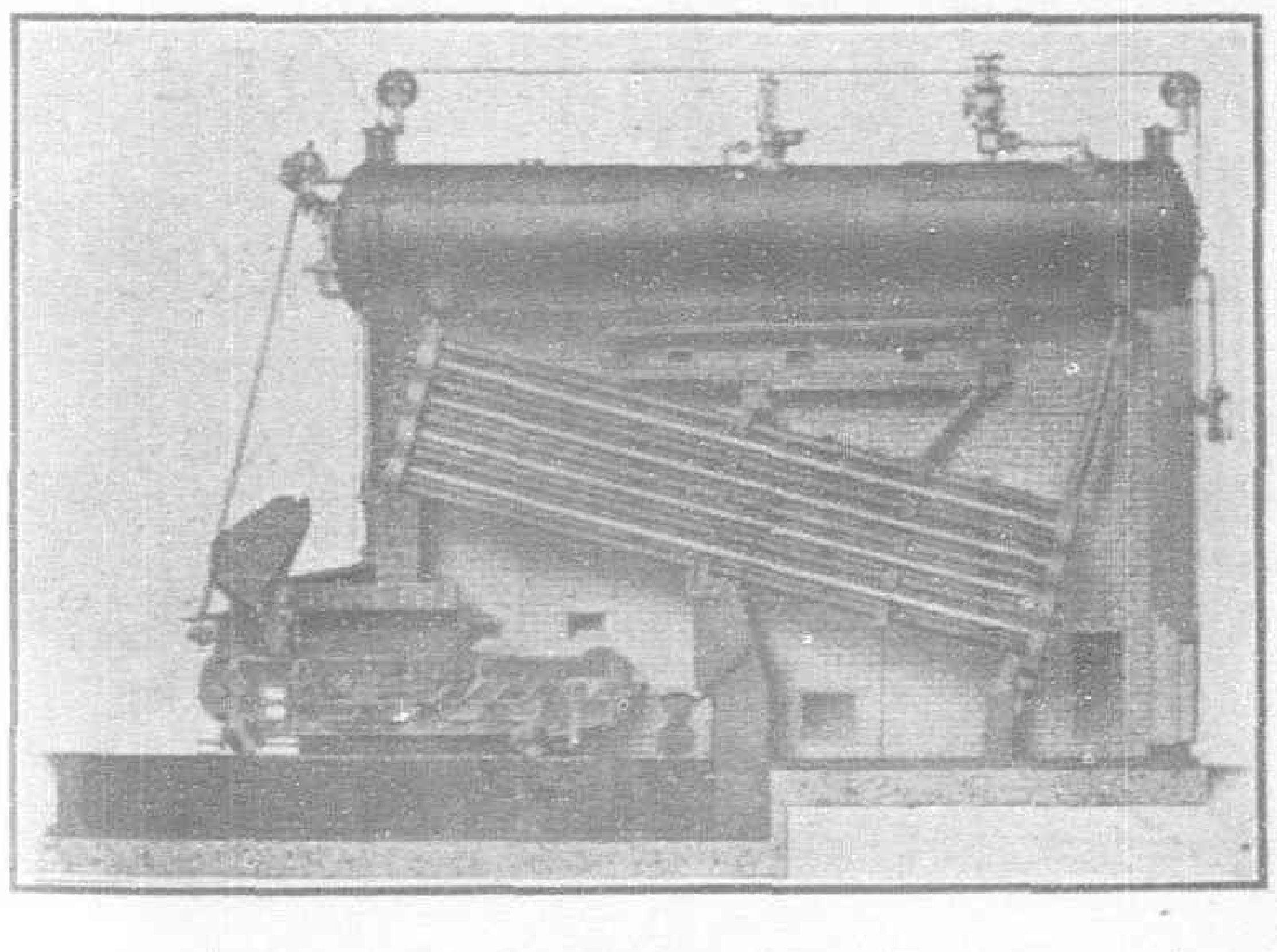
As supplied to the Pekin Syndicate Mines in Honan can be sectionalized so that no piece exceeds two hundred and fifty lbs. in weight.

Marine Boilers

Specially suitable for light draught and river steamers, where economy in weight and space is of importance.

Marine Type For Land Purposes

Is frequently used in Electricity Works, and occupies less space for the horse power generated than their Standard Land Type Boiler. As supplied to the Shanghai Municipal Electric Light Works.



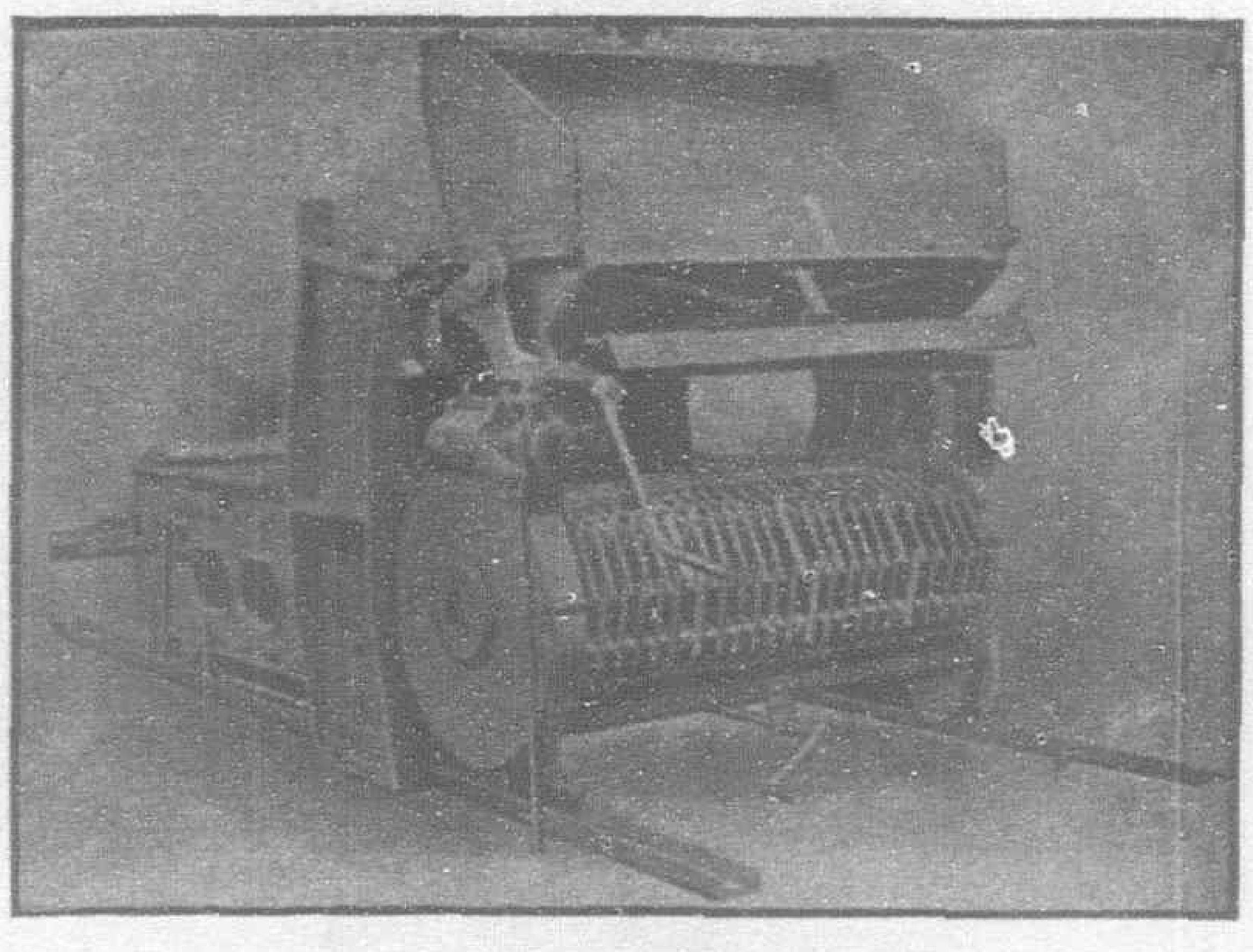
PATENT WATER-TUBE LAND BOILER, FITTED WITH PATENT INTEGRAL SUPERHEATER, LAND PATENT MECHANICAL CHAIN GRATE STOKER

STEEL AND IRON

Chimneys, self supporting or stayed, of any height or size.

BOMBAY OFFICE

Weeler's Bldgs. Hornby Rd.
BOMBAY



BABCOCK & WILCOX PATENT MECHANICAL CHAIN GRATE STOKER (WITH FIRE-DOOR OPEN)

POOLE, LAUDER & CO.

SHANGHAI, TIENTSIN, HANKOW **Representatives for the Chinese Empire**

KOBE
CANTON
HONGKONG
SHANGHAI
NEW YORK

SHEWAN, TOMES & Co

LONDON
OFFICE
YORK HOUSE
5 AND 7
ST. MARY AXE
LONDON, E. C.

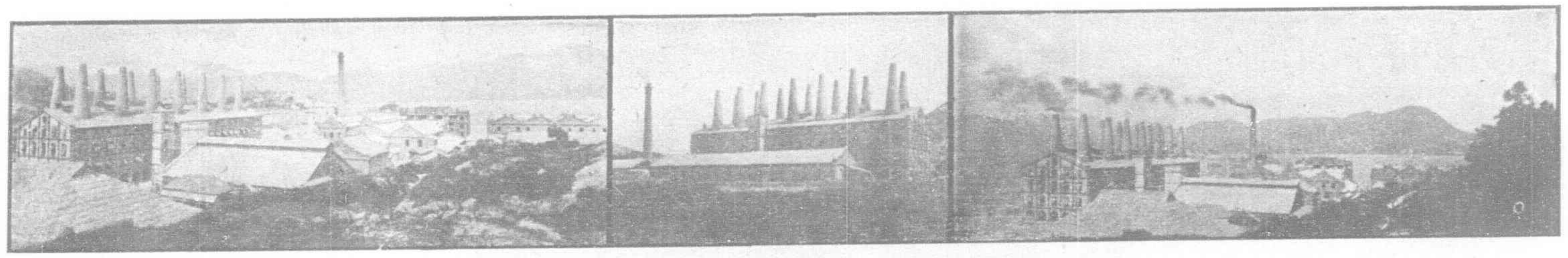
IMPORT AND EXPORT MERCHANDISE, COMMISSION AND SHIPPING AGENTS

Telegraphic Address:
"KEECHONG," Hongkong.

Post Office Box:
No. 131B.

GENERAL MANAGERS OF

The China Light & Power Co., Ltd., Hongkong
The Green Island Cement Co., Ltd., "
The Hongkong Rope Mfg. Co., Ltd., Hongkong
The China Provident Loan & Mortgage Co., Ltd., Hongkong
The China and Manila Steamship Co., Ltd., Hongkong
The Canton Land Co., Ltd.
Equitable Life Assurance Society of the United States Hongkong



WORKS OF THE GREEN ISLAND CEMENT COMPANY, LIMITED, HONGKONG

GLAZED
STONEWARE

HOUSE
DRAIN
AND
SEWER PIPES
AND
FITTINGS
IN STOCK

GLAZED
PAVING BRICKS
AND
TILES

FIRE
BRICKS
AND
FIRE CLAY

AGENTS:

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Shanghai	Shewan, Tomes & Co.	Singapore Penang	McAlister & Co., Ltd.	Bombay	E. Spinner & Co.
Japan	Shewan, Tomes & Co.			Rangoon	Geo. Gillespie & Co.

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J. Marke Wood's Line of Steamers
The Yangtsze Valley Company, Ltd.
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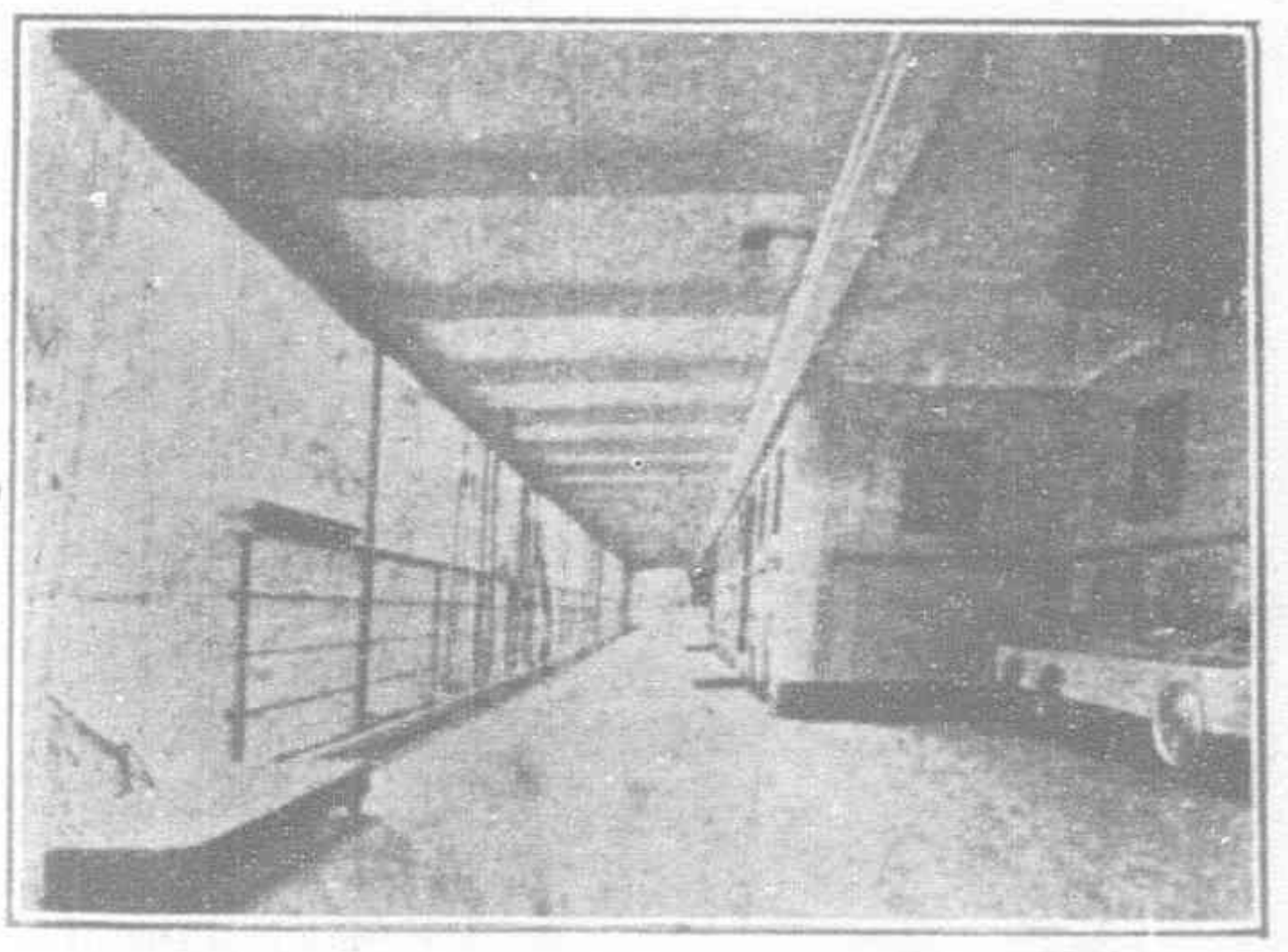
The American China Development Co.
The Yangtsze Insurance Association, Ltd.
World Marine Insurance Co.
Reliance Marine Insurance Co.
Union Marine Insurance Co., Ltd.
Batavia Sea and Fire Insurance Co.
North British & Mercantile Insurance Co.
Law Union & Crown Insurance Co.
Yorkshire Fire and Life Insurance Co.
Fireman's Fund Insurance Co. (Fire only)
Insurance Company of North America
The Chinese Engineering and Mining Company, Ltd.
Shanghai Pulp and Paper Co., Ltd.
Canton & Hongkong Tug, Lighter & Ferry Co., Ltd.
Tacoma Grain Co.

CHINA AND MANILA S. S. COMPANY, LIMITED



UPPER PROMENADE DECK.

HONGKONG TO MANILA

THE NEWEST, FASTEST, AND MOST LUXURIOUS STEAMERS PLYING BETWEEN HONGKONG AND MANILA. BUILT IN 1901, ALL LATEST IMPROVEMENTS—ACCOMMODATION AMIDSHIPS—ELECTRIC LIGHTS, FANS, ETC. : : : : : : : : : :

STEAMERS
"ZAFIRO" "RUBI"
WEEKLY SAILINGS. ONLY TWO NIGHTS AT SEA

SHEWAN, TOMES & CO.—GEN. MGRS.
HONGKONG

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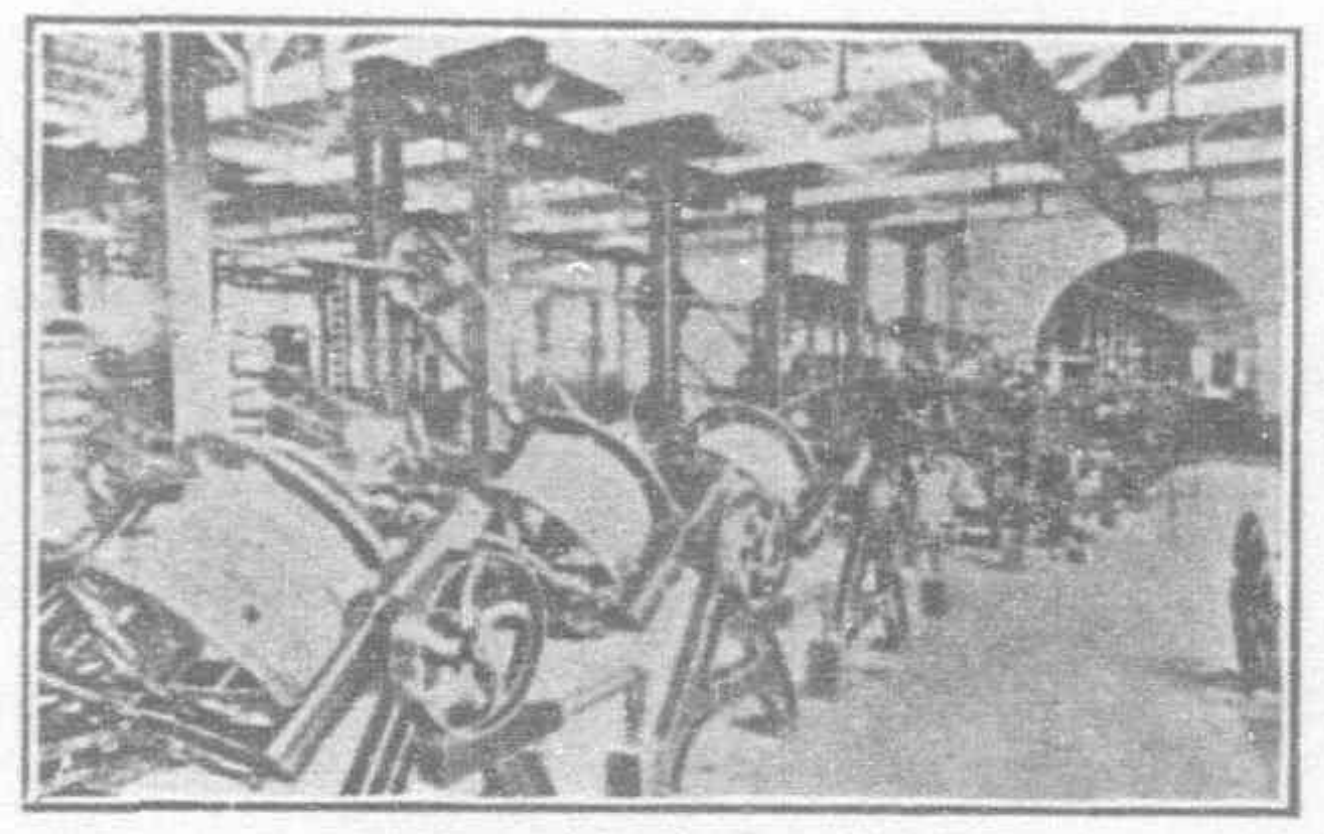
WARNER, BARNES & CO., LD.
MANILA
TAIT & CO.
AMOY

HONGKONG ROPE MANUFACTURNIG COMPANY, LTD.



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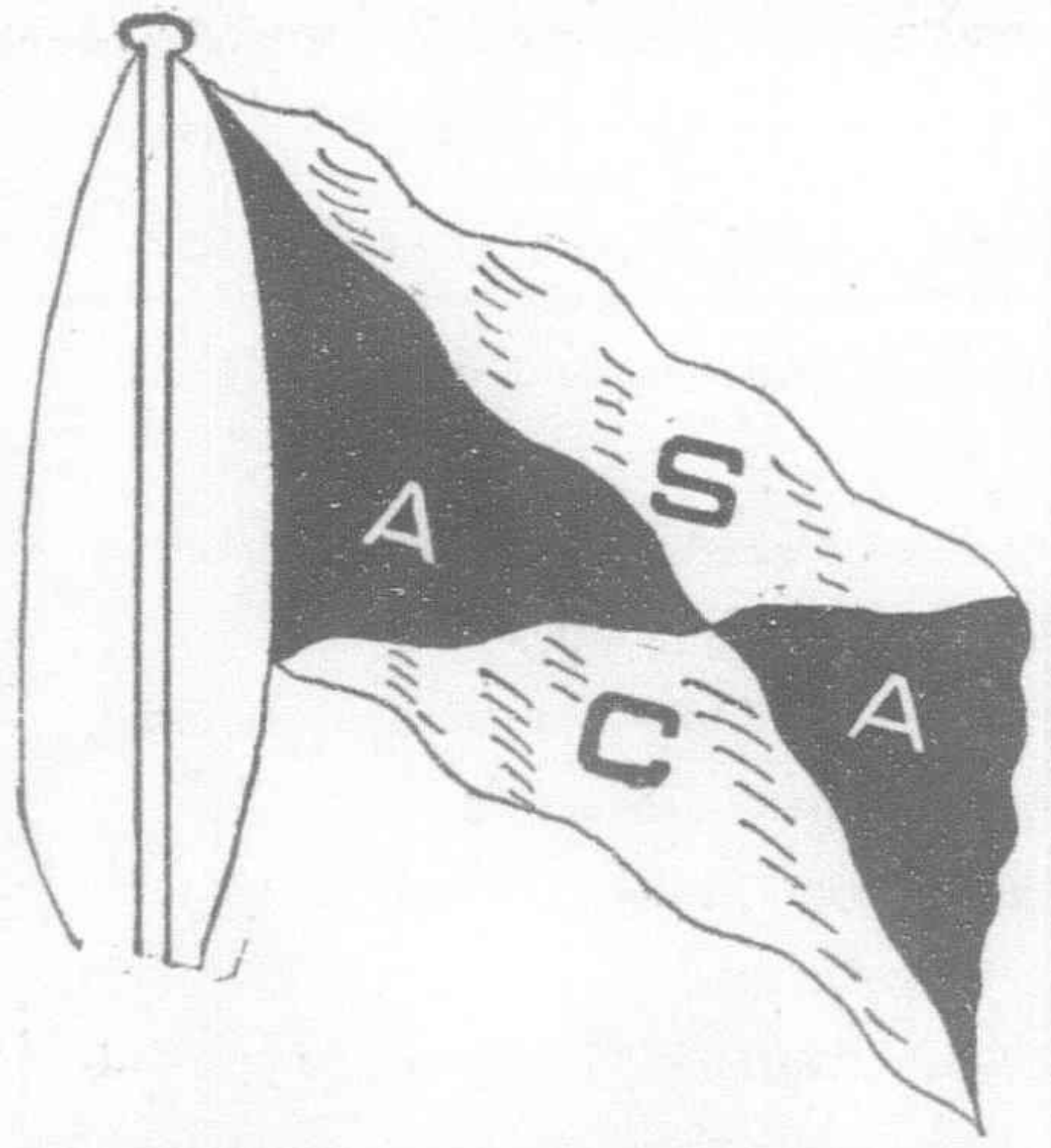
PURE MANILA ROPE

MADE FROM ONLY THE BEST WHITE MANILA HEMP.

USED BY THE BRITISH NAVY ON THE CHINA STATION, AND BY THE MAIL AND LEADING LINES OF STEAMERS

SHEWAN, TOMES & CO.
GENERAL MANAGERS

AMERICAN ASIATIC STEAMSHIP CO.



REGULAR MONTHLY SAILINGS VIA SUEZ CANAL, BETWEEN
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RETURNING TO NEW YORK BY THE SAME ROUTES

THROUGH BILLS OF LADING ISSUED, AND RATES QUOTED TO ALL POINTS, INSURANCE AT LOWEST RATES, SHIPMENTS TO OR FROM INTERIOR POINTS GIVEN THE MOST CAREFUL ATTENTION.

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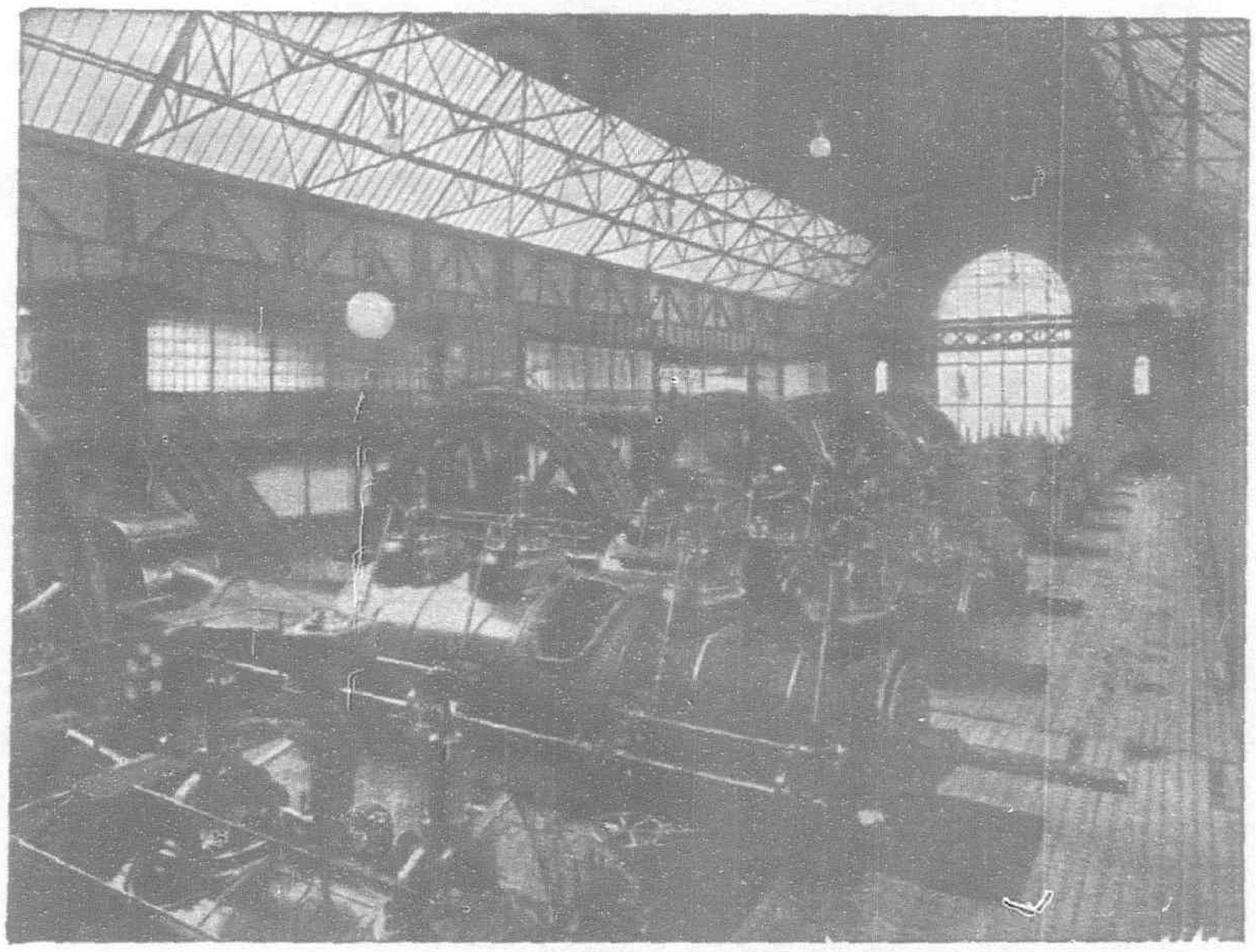
AGENTS
MANILA

Arnhold, Karberg & Co.

Shanghai, Hongkong, Canton, Hankow, Wuhu, Chungking, Tientsin, Tsingtau, Newchwang.



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Wireless Telegraphy Co. (System Telefunken)
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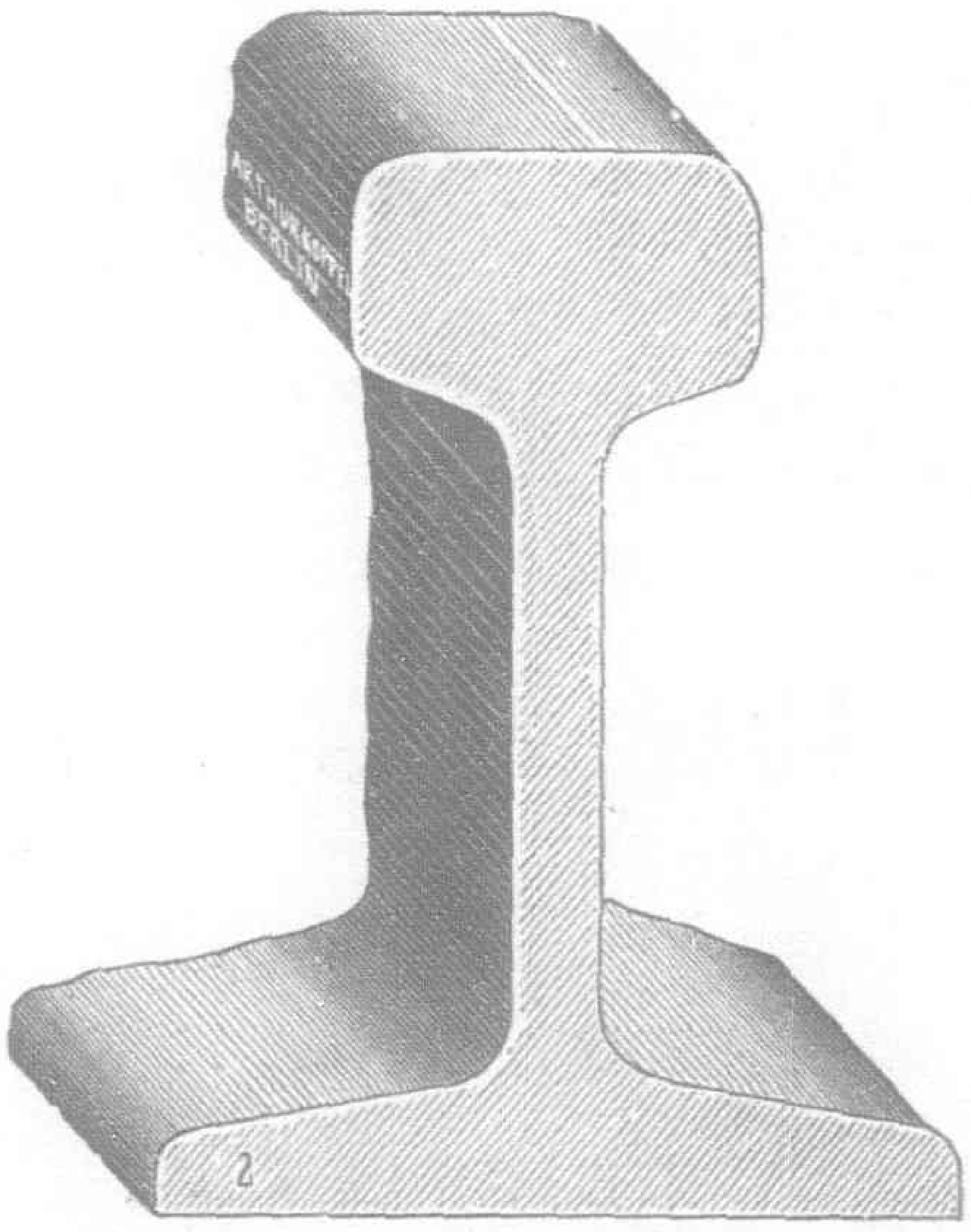
A. Borsig, Tegel-Berlin (Engines, Pumps, Boilers, Ice Machines, etc.)
Deutsche Waffen and Munitions fabriken
Karlsruhe (Arms, Mint Factories, etc.)
Waffenfabrik Mauser A. G. Oberndorf-Neckar Arms Works.



RAIL

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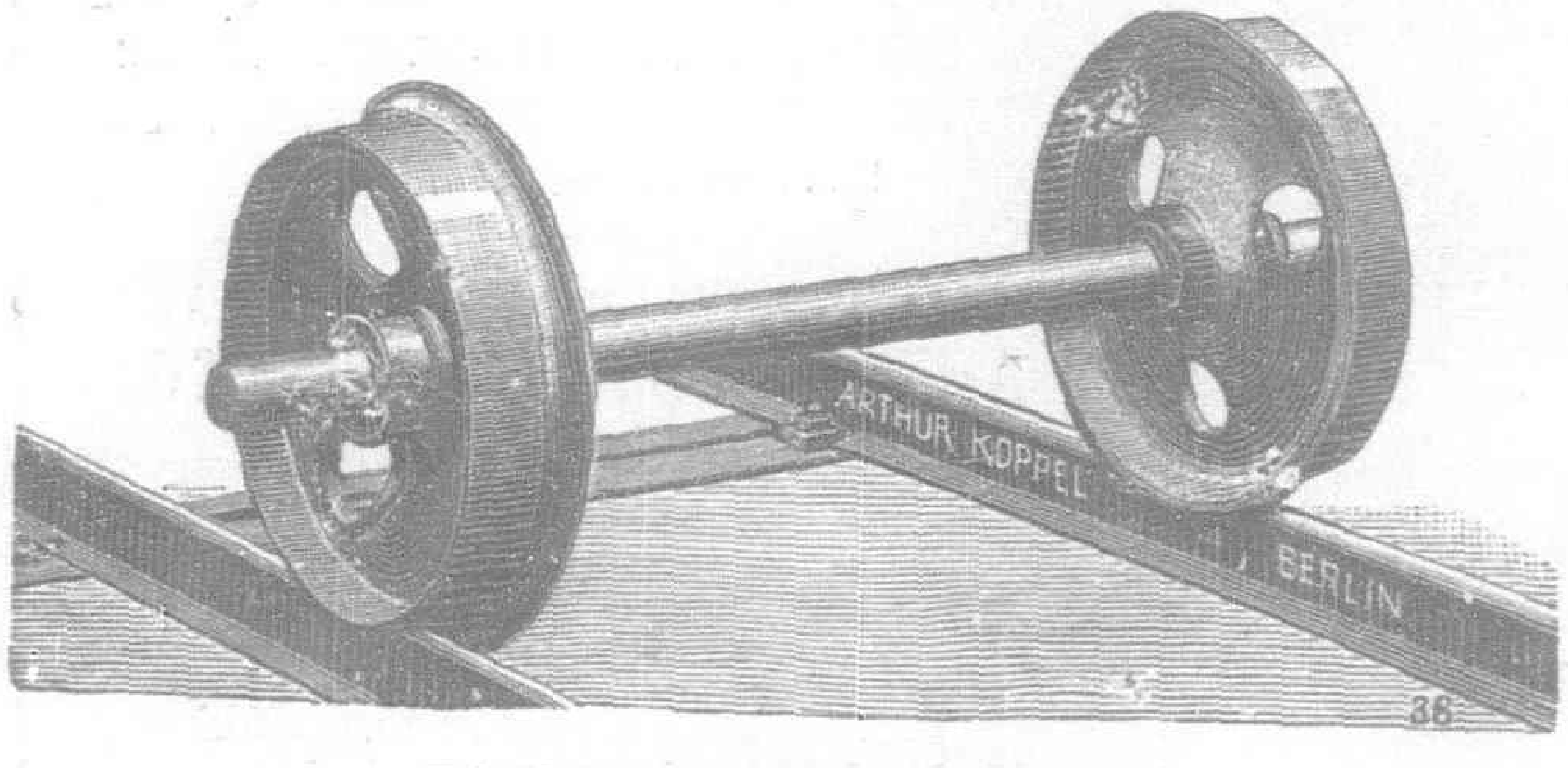
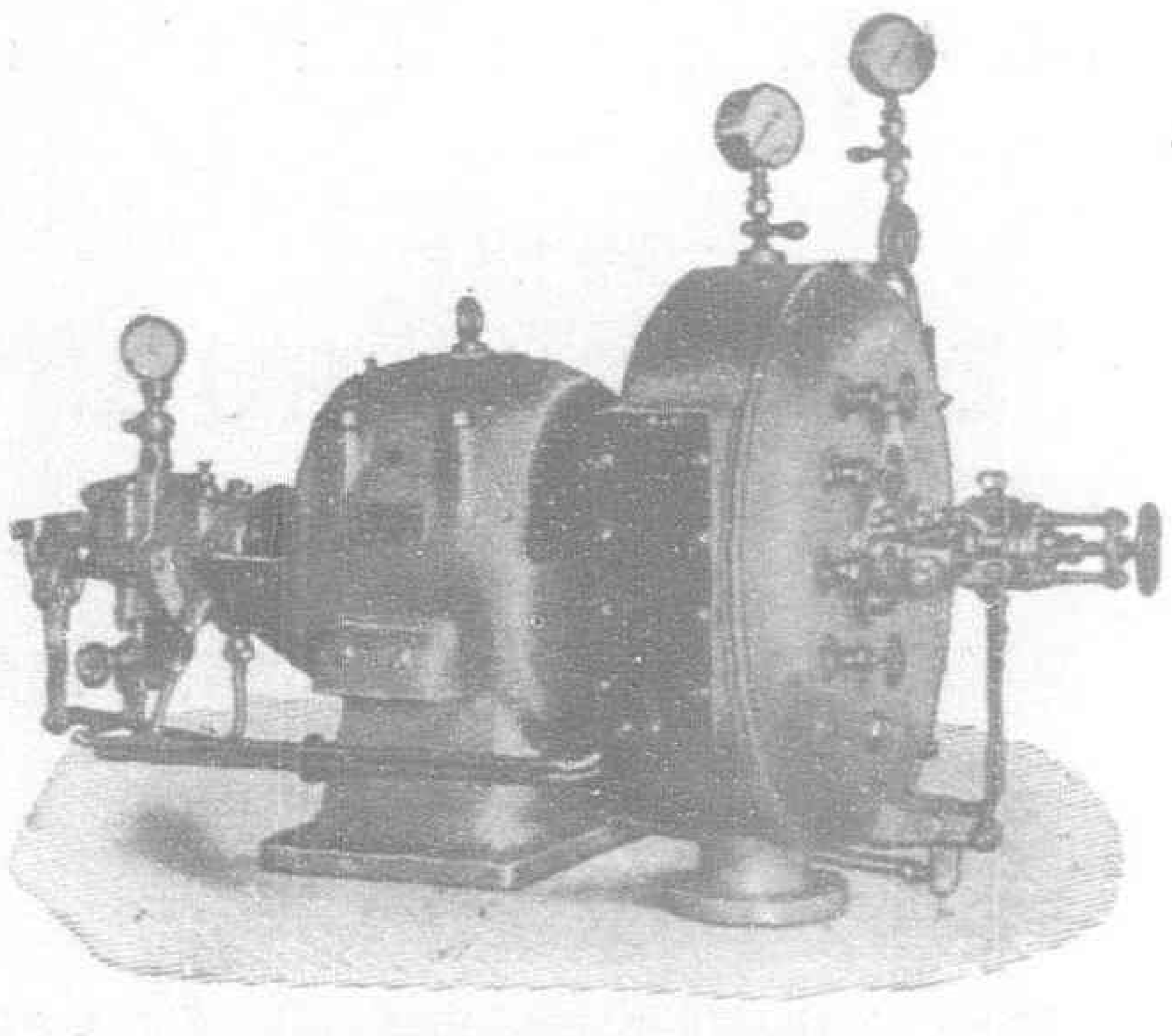
Ludw. Loewe A. G. Berlin (Machine Tools)
Stettiner Maschinenbau A. G. Vulcan (Marine Contractors)
Jonas and Colver Ltd. Sheffield (Specialities for Arsenals)
Asa Lees and Co., Ltd. Oldham (Equipments for Cotton Mills)
Carl Meissner Hamburg (Motor Boats)
Rendrock Powder Co. New York (Explosives, Racarock)
General Managers of the New Engineering and Shipbuilding Works Ltd. Shanghai.



RAILWAY WHEELS AND AXLE

Estimates and prices given on application at all head offices.

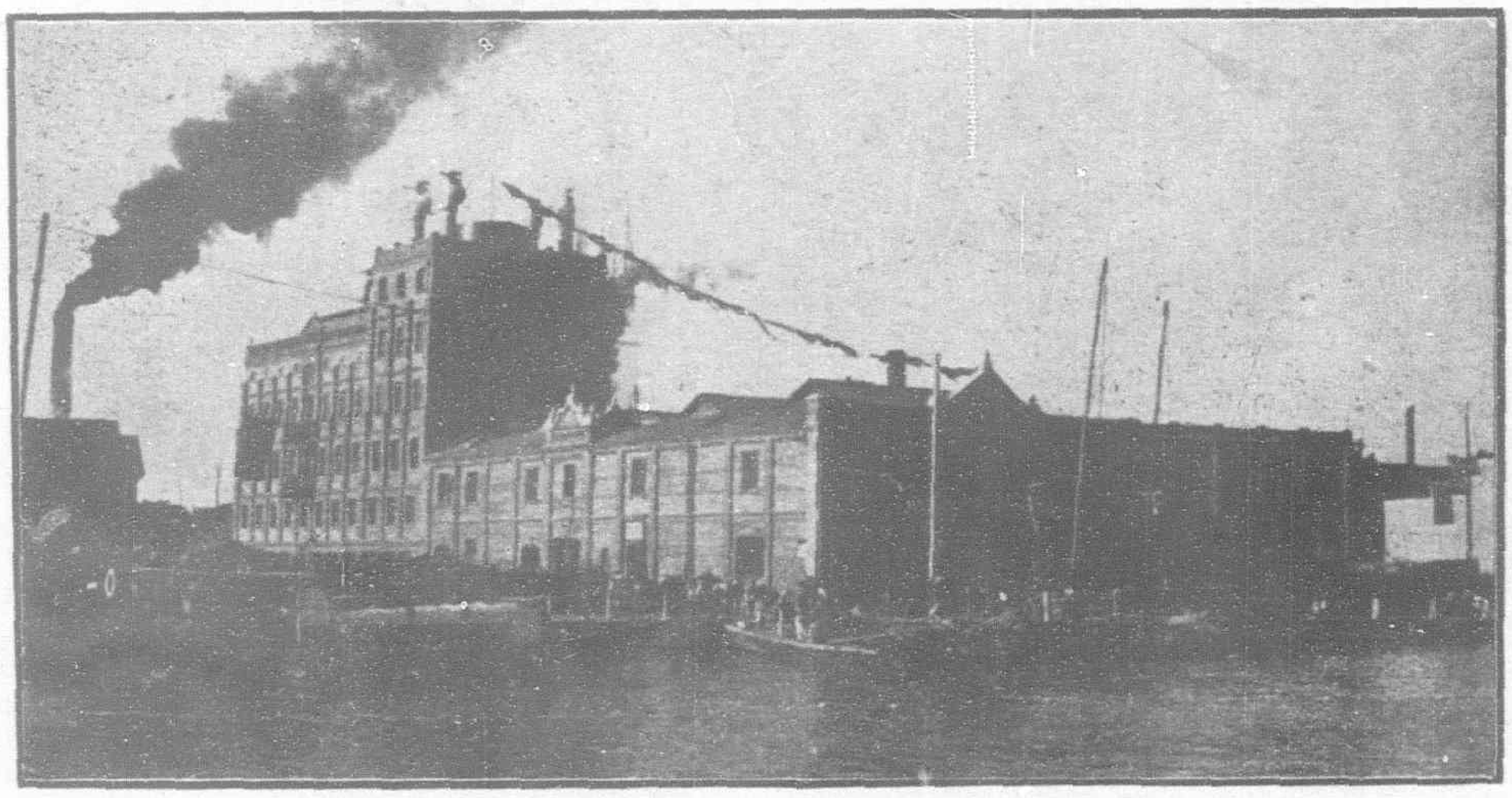


TURBO-GENERATOR

JARDINE, MATHESON & CO.

MACHINERY DEPARTMENT
PEKING ROAD, SHANGHAI

ENGINES, BOILERS, PUMPS AND ELECTRICAL MACHINERY FOR ALL PURPOSES
ENGINEERING AND ELECTRICAL SUPPLIES IN STOCK



YUEN-CHONG FLOUR MILLS, SOOCHOW-ST, SHANGHAI; MACHINERY EQUIPMENT BY JARDINE, MATHESON & CO.

SOLE AGENTS FOR:—John & Edward Wood. J. H. Gwynne & Co. Marshall, Sons & Co., Ltd. E. Scott & Mountain, Ltd. Merryweather & Sons, Ltd. The Campbell Gas Engine Co., Ltd. A. Ransome & Co., Ltd. J. Meridith, Jones & Sons. Kitson Light Foreign Supply Company.

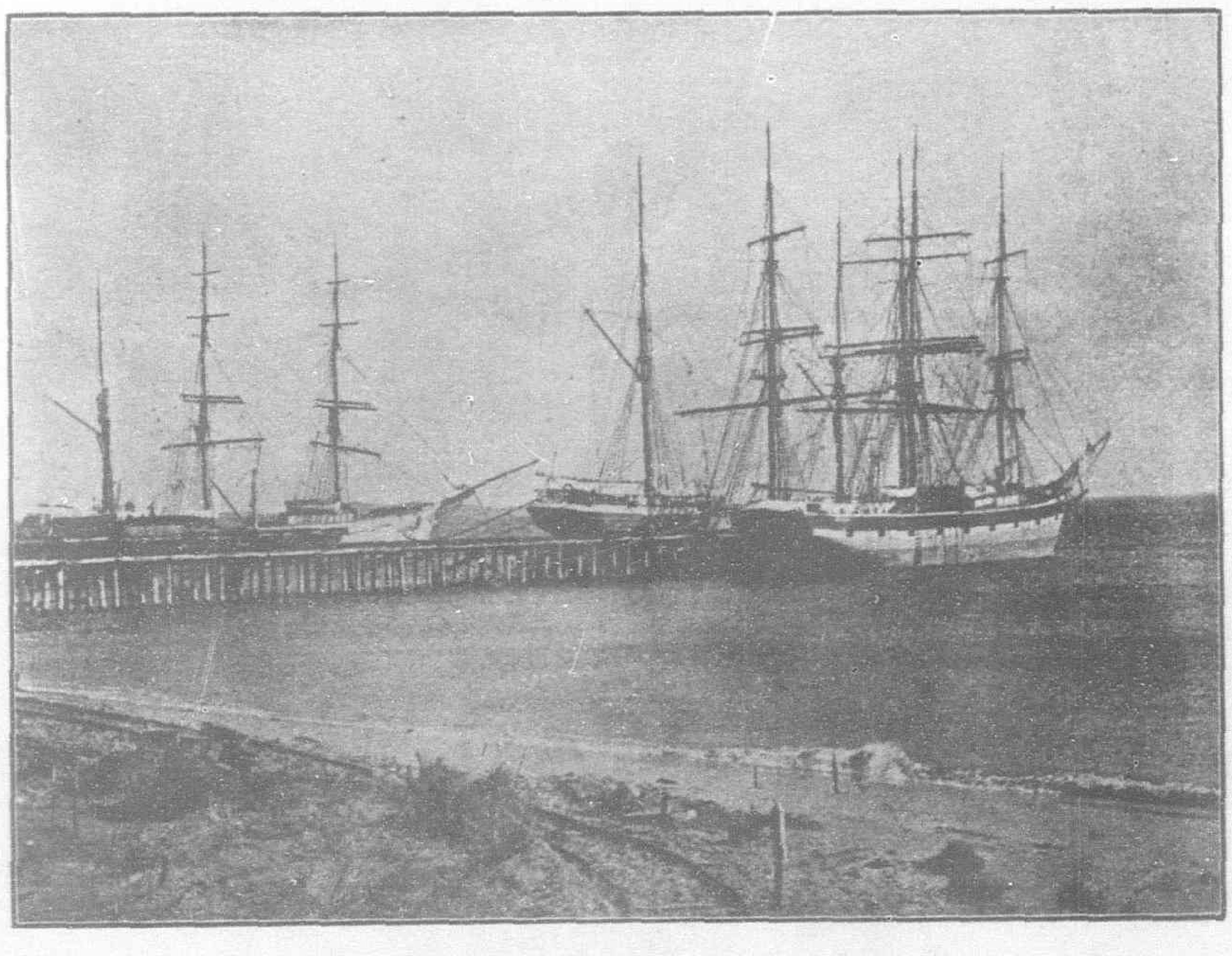
MILLAR'S KARRI AND JARRAH CO., LTD.

KARRI
AND
JARRAH

COMBINE GREAT STRENGTH WITH DURABILITY AND ARE IMPERVIOUS TO DESTRUCTIVE INSECTS AND DAMP

SPECIALLY ADAPTED FOR ALL KINDS OF ENGINEERING AND CONSTRUCTION WORK CABINET, ART WORK AND WOOD PAVING

LARGE STOCKS CARRIED RAILWAY SLEEPERS, PILES WHARF AND BRIDGE TIMBERS, TELEGRAPH POLES, FLOORING, PAVING BLOCKS, ETC.



COMPANY'S PRIVATE WHARF

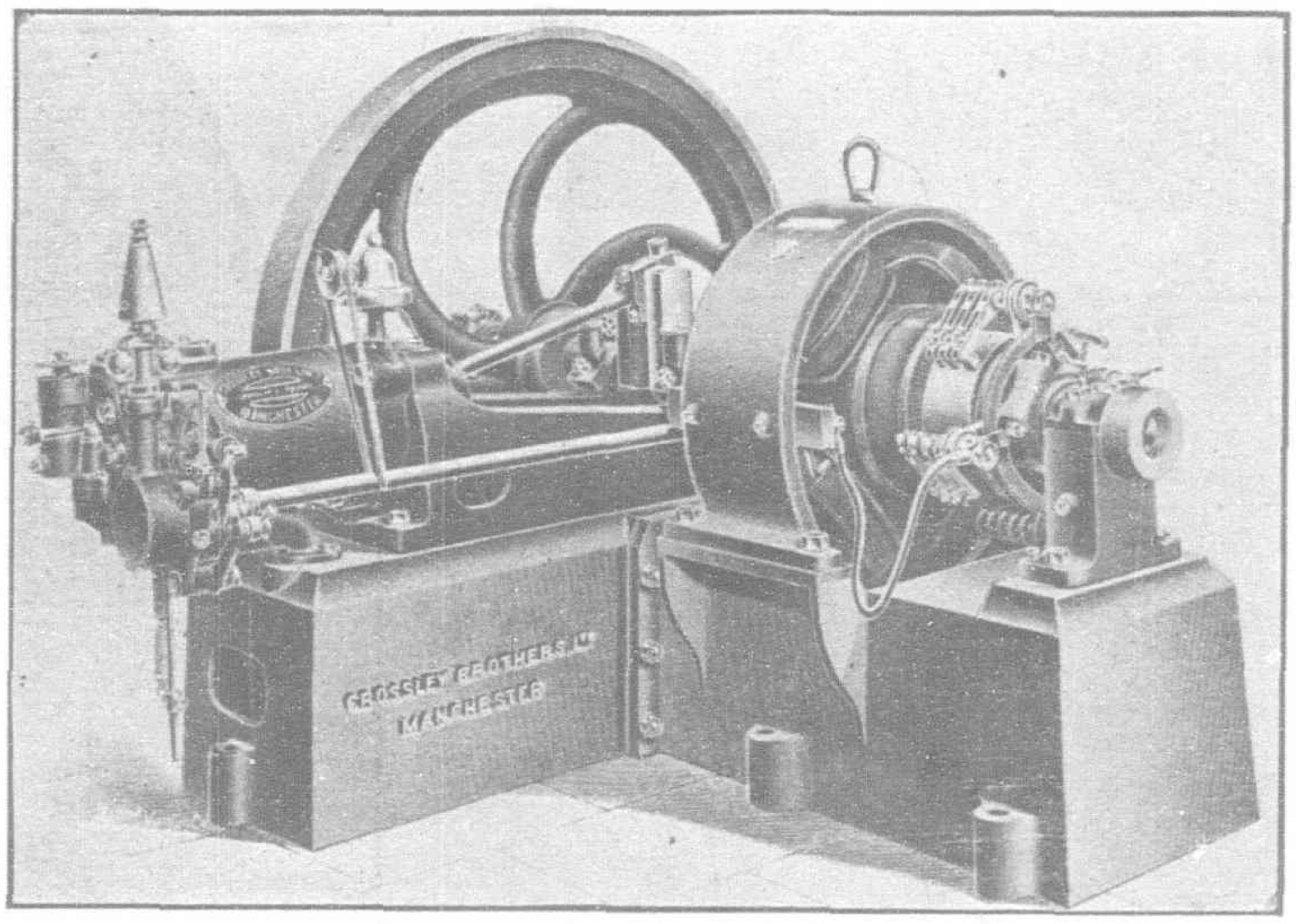
EWO TIMBER DEPOT
SHANGHAI

KARRI, JARRAH
OREGON PINE
REDWOOD
BANGKOK TEAK
SINGAPORE
HARDWOODS

OPERATING OWN SAW MILL SUPPLYING ANY SIZES AND LENGTHS.

JARDINE, MATHESON & CO.
AGENTS
HONGKONG CHINA JAPAN

The Shanghai Gas Co., Ltd.



4 KILOWATT PLANT, DIRECT CONNECTED TO CROSSLEY ENGINE

WORKS: THIBET ROAD, SHANGHAI
SHOWROOMS: 31a NANKING ROAD, SHANGHAI

Sole Agents For

CROSSLEY'S GAS ENGINES

INDICATING ¾ TO 220 H. P.

MOST ECONOMICAL FOR ALL PURPOSES WHERE POWER IS REQUIRED.

CHAFF CUTTING, PUMPING, WOOD WORKING, PRINTING, HOISTING, PRESSING, WEAVING, SPINNING, MILLING, ETC.

ESPECIALLY ADAPTED FOR ISOLATED ELECTRIC LIGHTING PLANTS IN HOTELS AND PUBLIC BUILDINGS, ETC.

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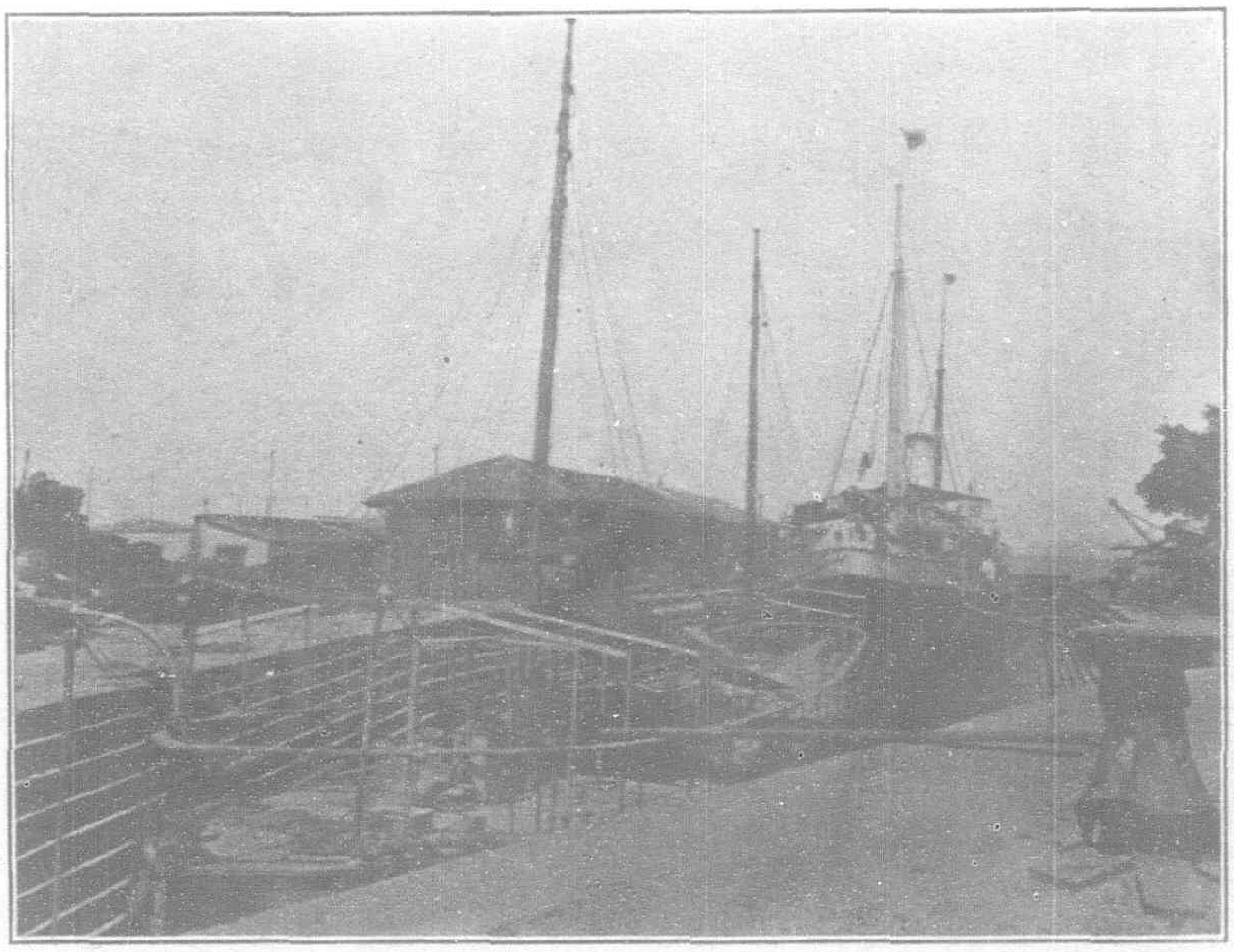
AMOY, CHINA

THE NEW AMOY DOCK COMPANY, LIMITED
(ESTABLISHED IN 1892.)

CODES USED:
A. B. C., 5TH EDITION, AND
ENGINEERING TELEGRAPHIC
CODE AND SUPPLEMENT

OUR GRANITE DOCK IS A TIDAL SLIPWAY AND HAS AN EXTREME LENGTH OF 360 FT., WITH A LENGTH ON BLOCKS OF 340 FT. IT CAN RECEIVE VESSELS UP TO 330 FT. BETWEEN PERPENDICULARS, 40 FT. BEAM AND A MEAN DRAFT OF 16½ FT. DURING SPRING TIDE, AND 12 FT. DURING NEAPS : : : : : :

THE MOST CONVENIENT AND SATISFACTORY DOCK FOR PHILIPPINE SHIPOWNERS, ON ACCOUNT OF LOCATION AND DISTANCE : : : : : :



GRANITE DOCK

OUR SLIPWAY IS EQUIPPED WITH THE LATEST MODERN PLANT, AND CARRIES A LARGE STOCK OF MATERIAL FOR THE REPAIR OF SHIPS, ENGINES AND BOILERS : : : : :

ANOTHER SPLENDID SLIPWAY IS NOW UNDER CONSTRUCTION, WHICH WILL TAKE UP VESSELS OF FROM 250 TO 300 TONS : : : : : : :

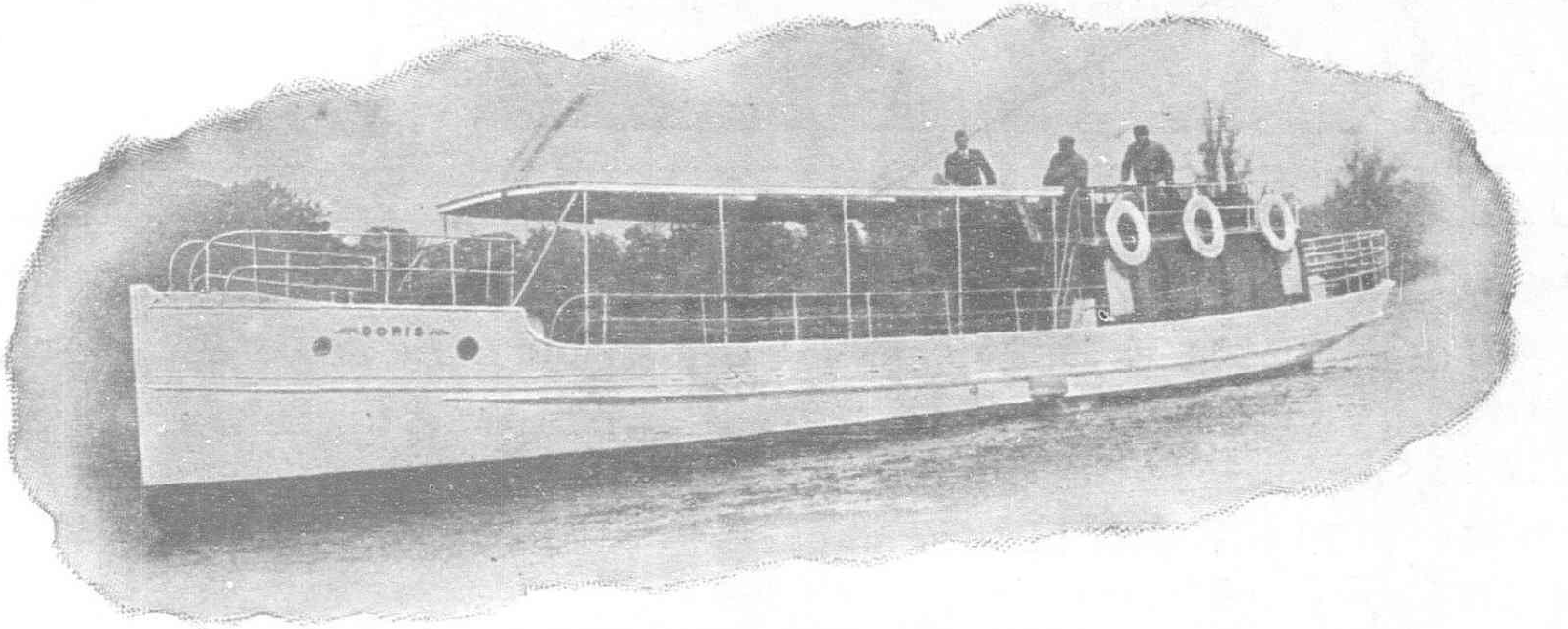
WRITE TO US FOR ESTIMATES

WE GUARANTEE ONLY HIGH GRADE WORK

The New Amoy Dock Company, Limited
AMOY, CHINA

Riley, Hargreaves & Company, Ltd.

SHIPBUILDERS AND STEEL CONSTRUCTIONAL ENGINEERS



60 FEET MOTOR PASSENGER BOAT

"Brooke"
Motor Boats

HIGH CLASS
RELIABLE
PRODUCTIONS

Write for Particulars

Sole Agents for J. W. Brooke & Co., Ltd., England

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Cable Address:
"HARGREAVES SINGAPORE"

RICHARDSON, FINDLAY & CO.
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FINDLAY & CO.
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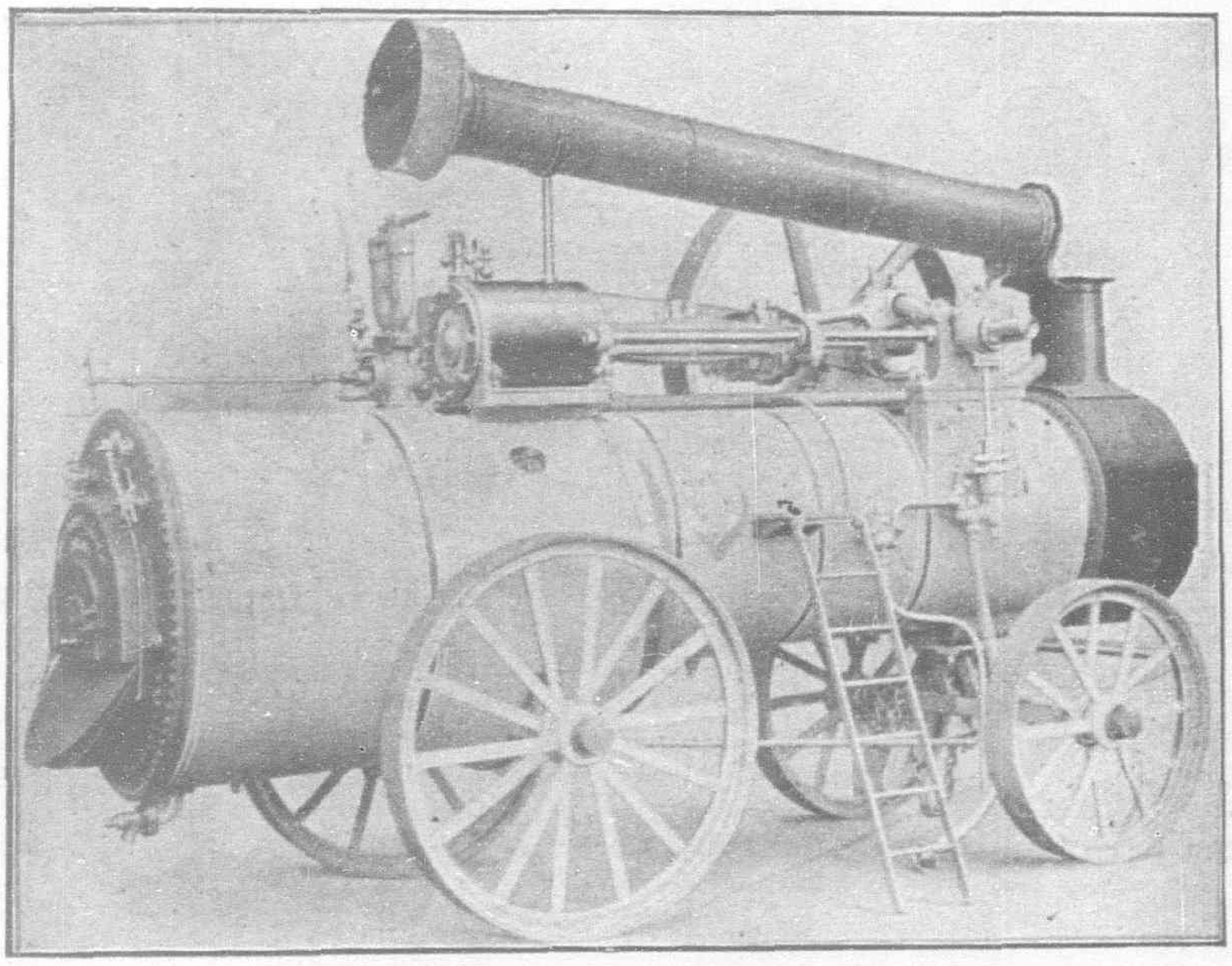

"COLONIAL" PORTABLE ENGINE

MILNER'S SAFES

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Agents for
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5TH EDITION

THE COMPANY OWNS

THE COAL MINES NOW BEING WORKED AT TONGSHAN AND LINSI IN THE CHIHLI PROVINCE, AND THE COAL FIELD IN WHICH THEY ARE SITUATED. THE QUALITY OF THE COAL IS SUPERIOR TO ANY NOW BEING MINED IN THE FAR EAST, AND IS SUITABLE FOR STEAMING AND ALL OTHER PURPOSES. THE COKE PRODUCED IS EQUAL TO THE BEST ENGLISH COKE AND COMMANDS A READY MARKET

OUTPUT AND SALES

1,000,000 TONS PER ANNUM
CARGOES DELIVERED BY
COMPANY'S OWN STEAMERS
TO ANY PORT IN THE FAR EAST

THE COMPANY HAS

FACILITIES FOR LOADING COAL AT THE ICE FREE PORT OF CHIN-WANG-TAO, WITH WHICH IT IS IN RAILWAY COMMUNICATION

THE IMPERIAL RAILWAYS OF NORTH CHINA AND THE LUHAN RAILWAY USE THIS COAL FOR THEIR LOCOMOTIVES, AND AN EXTENSIVE BUNKERING BUSINESS IS DONE WITH STEAMERS

TONGSHAN COAL CEMENT

TONGSHAN CEMENT-WORKS, NORTH-CHINA
Portland Cement
唐山洋灰

TONGSHAN PORTLAND CEMENT

IS MANUFACTURED FROM THE BEST RAW MATERIALS BY COMPLETE AND MODERN MACHINERY UNDER EXPERT SUPERVISION. UNIVERSALLY USED THROUGHOUT NORTH CHINA AND HAS SECURED THE HIGHEST APPROVAL FOR ITS GOOD QUALITY, CONSTANCY OF VOLUME AND FINENESS : :

TONGSHAN PORTLAND CEMENT

WAS AWARDED A SILVER MEDAL AT ST. LOUIS EXPOSITION, DECEMBER, 1904 : :

MOSAIC FLOORING TILES

Equal in quality and finish to best European Make, Large Variety of Artistic Designs for Center and Border Tiles to meet any requirement.

FIREBRICKS

The excellent seams of fireclay in the neighborhood of Tongshan enables us to place in the Chinese market a very superior firebrick at about one fourth the cost of the imported article. Output 50,000 bricks per day. Arch and cupola bricks, boiler seating blocks, and special shapes, made to order.

FIRECLAY FLOORING TILES

For Kitchens, Verandas, Public Buildings, etc., etc., etc.,
MADE OF FIRE CLAY IN ATTRACTIVE DESIGNS

SHANGHAI BRANCH OFFICE, N° 1 JINKEE ROAD

CHEFOO: CARLOWITZ & CO.
WEI-HAI-WEI: LAVERS & CLARK
TSINGTAU: GEBRUDER LAENGNER
HONGKONG: SHEWAN, TOMES & CO.
HANKOW: BELGIAN TRADING CO.
NEWCHWANG: BUSH BROS.
PEKING: J. REDELSPERGER.

TELEPHONES:

856 President's and Vice-President's Office. (Long Distance.)
151 Secretary's Office.
24 Engineering Department.
633 Shipbuilding Department.
737 Store Department. (Long Distance.)

Cable Address:

"DOCKYARD"

A1, A B C, Scott, Western Union Engineering Codes Used

KAWASAKI DOCKYARD CO., LTD.

KOBE, JAPAN

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY, NAVY AND FOREIGN GOVERNMENTS

POWERFUL SALVAGE AND TOWING BOATS AVAILABLE AT SHORTEST NOTICE

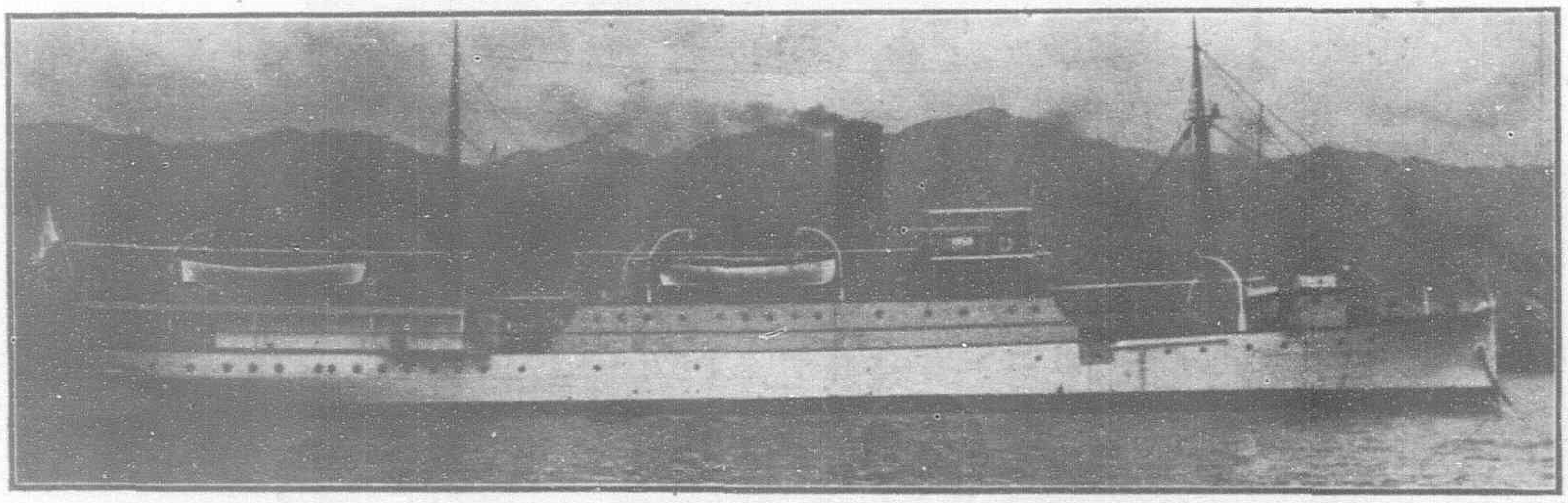
SHIPBUILDERS, ENGINEERS, BOILERMAKERS

MANUFACTURERS OF CAST STEEL RUDDERS, STERN FRAMES, PROPELLER BLADES, BRACKETS AND STEMS, STEEL GEARING, PISTONS, CYLINDERS AND ENGINE CASTINGS

ALL WORK GUARANTEED TO BE OF THE HIGHEST ORDER AND TO CONTAIN ALL THE MOST UP-TO-DATE IMPROVEMENTS

PARTICULARS OF DOCK AND SLIPS

No. 1 Graving Dock,	
Length	425 ft. 6 in.
Width of entrance on top	63 ft. 6 in.
Width of entrance on bottom	51 ft. 7 in.
Depth over sill	23 ft. 7 in.
No. 2 Patent Slip,	
Length	180 ft. 0 in.



LIGHTHOUSE TENDER "KWANGCHEI," BUILT FOR THE IMPERIAL COREAN MARITIME CUSTOMS, 1904, BY THE KAWASAKI DOCKYARD CO., LTD.

K. Matsukata,	*President*
Y Kawasaki,	*Vice-President*
M. Yotsumoto,	*Secretary*
H. Kumata,	*Accountant*
F. T. Sumura,	*Superintendent*
T. Saka, Dr.,	*Chief Engineer*
T. Tanaka,	*Chief Constructor*
G. Matsukata,	*Chief Storekeeper*

The Dockyard extends along almost the whole length of the shore of the Western Harbor and is in close proximity to Shipping Berths.

EL VARADERO DE MANILA

(INCORPORATED)—Established in 1884

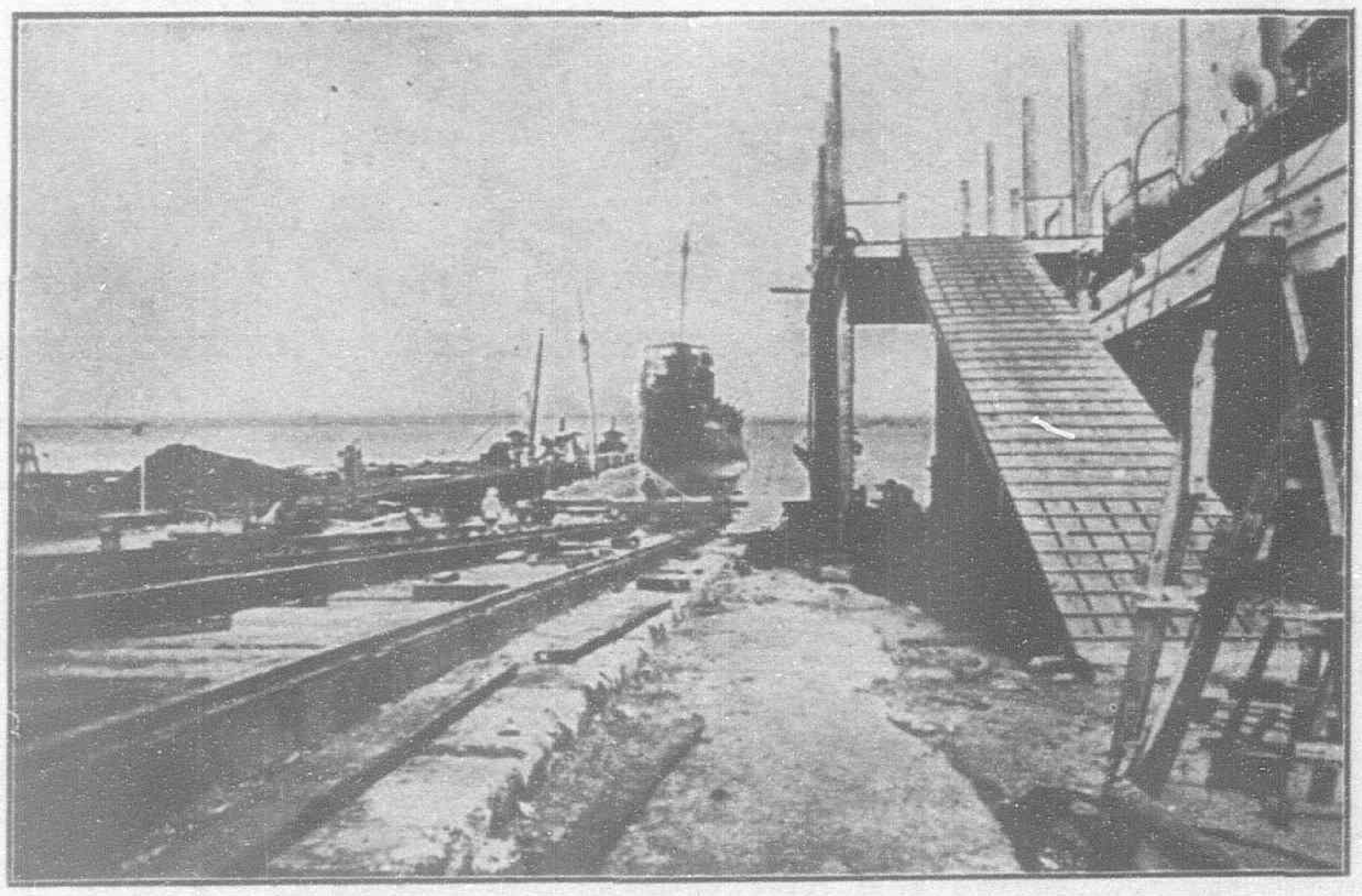
Cable Address
R. REYES
Manila

P. O. Box 202

HEAD OFFICE
Manila, P. I.

RAFAEL REYES
General Manager

Our Slipway is equipped with an up-to-date plant, and carries a large stock of material for the repair of ships, engines and boilers.



Codes Used
A B C, 4th Edition
WESTERN UNION
and A I

SLIPWAY and DOCKS

Located at the sheltered harbor of

CANACAO
CAVITE, P. I.

Director of Works,
MR. A. YOUNG

SLIP No. 1. Length 320 feet capacity 2400 gross tons
SLIP No. 2. " 210 feet capacity 1200 gross tons

THE MANILA SLIP COMPANY

MANILA, P. I.

SANTA CRUZ BRIDGE

WM. H. ANDERSON & CO.

IMPORTERS AND EXPORTERS: COMMISSION AGENTS

MANILA, P. I.

AGENTS IN THE PHILIPPINES FOR

GREEN ISLAND CEMENT COMPANY, LIMITED

FARM AND ROAD WAGONS OF EVERY DESCRIPTION

LIBBY, McNEILL & LIBBY

SWIFT & COMPANY

BRUNSWICK-BALKE COLLENDER CO.

CULTIVATOR.

DIEBOLD SAFES

AERMOTOR COMPANY

LUBRICATING OILS

DEERE IMPLEMENT COMPANY

HILBERT BROS.

ETC., ETC.

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Ships, Launches and Pontoons Designed & Supervised

WILKS & JACK

CONSULTING ENGINEERS AND SURVEYORS

Cable Address: "MARINEWORK"

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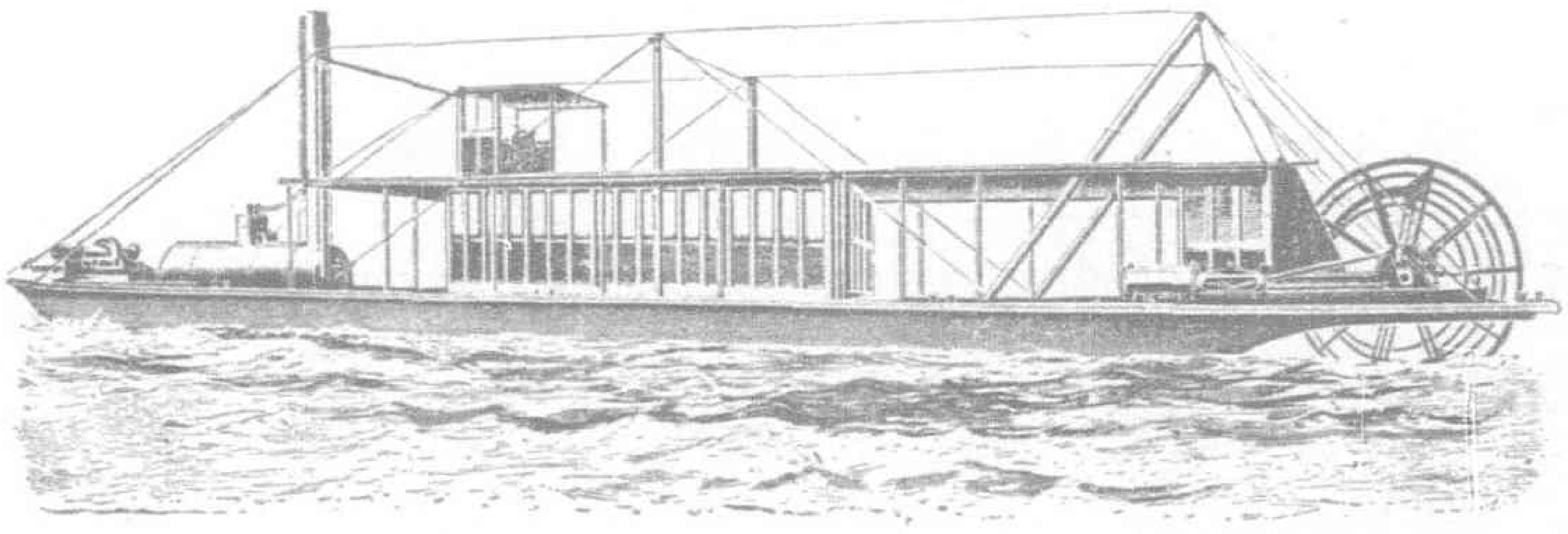

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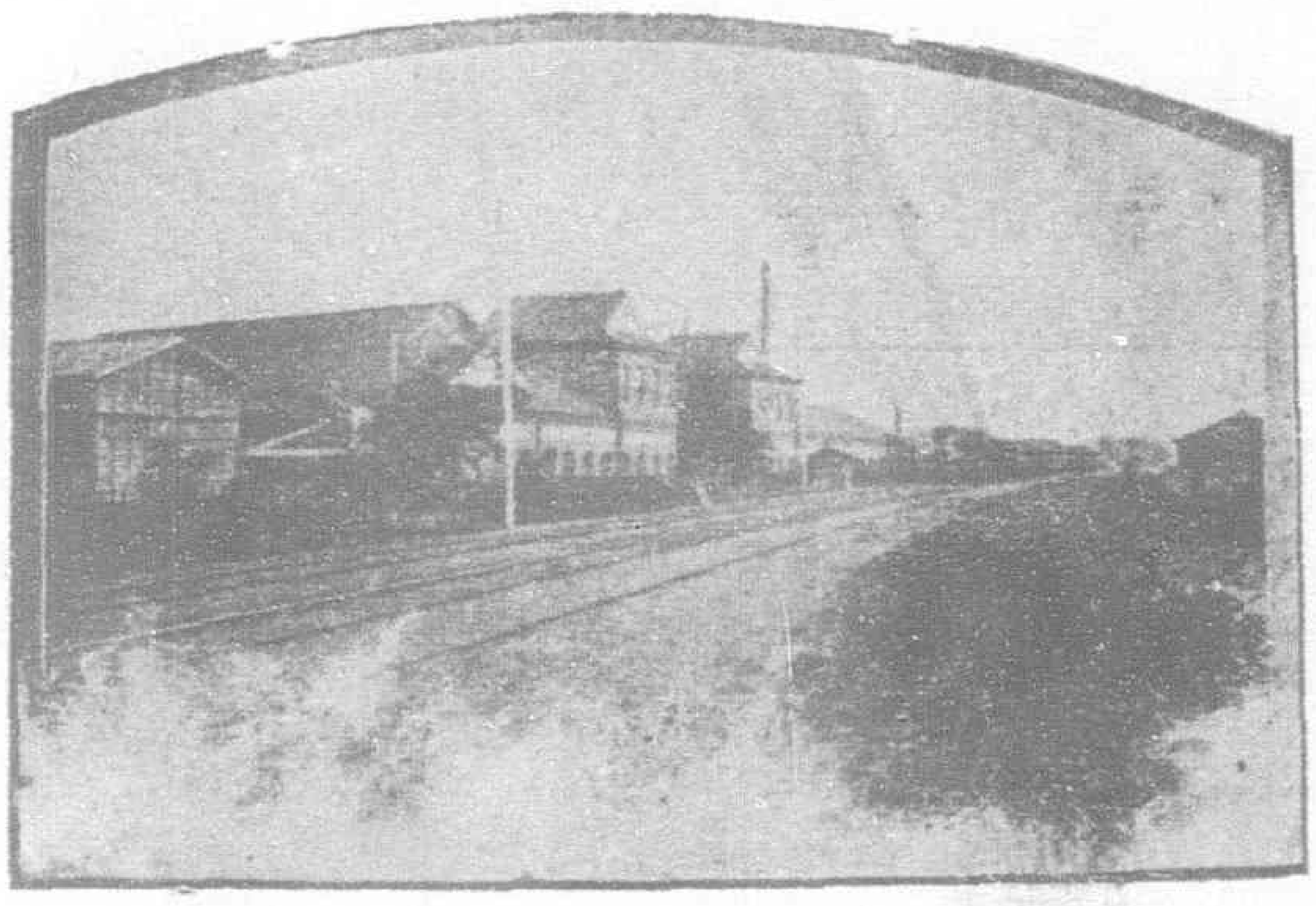

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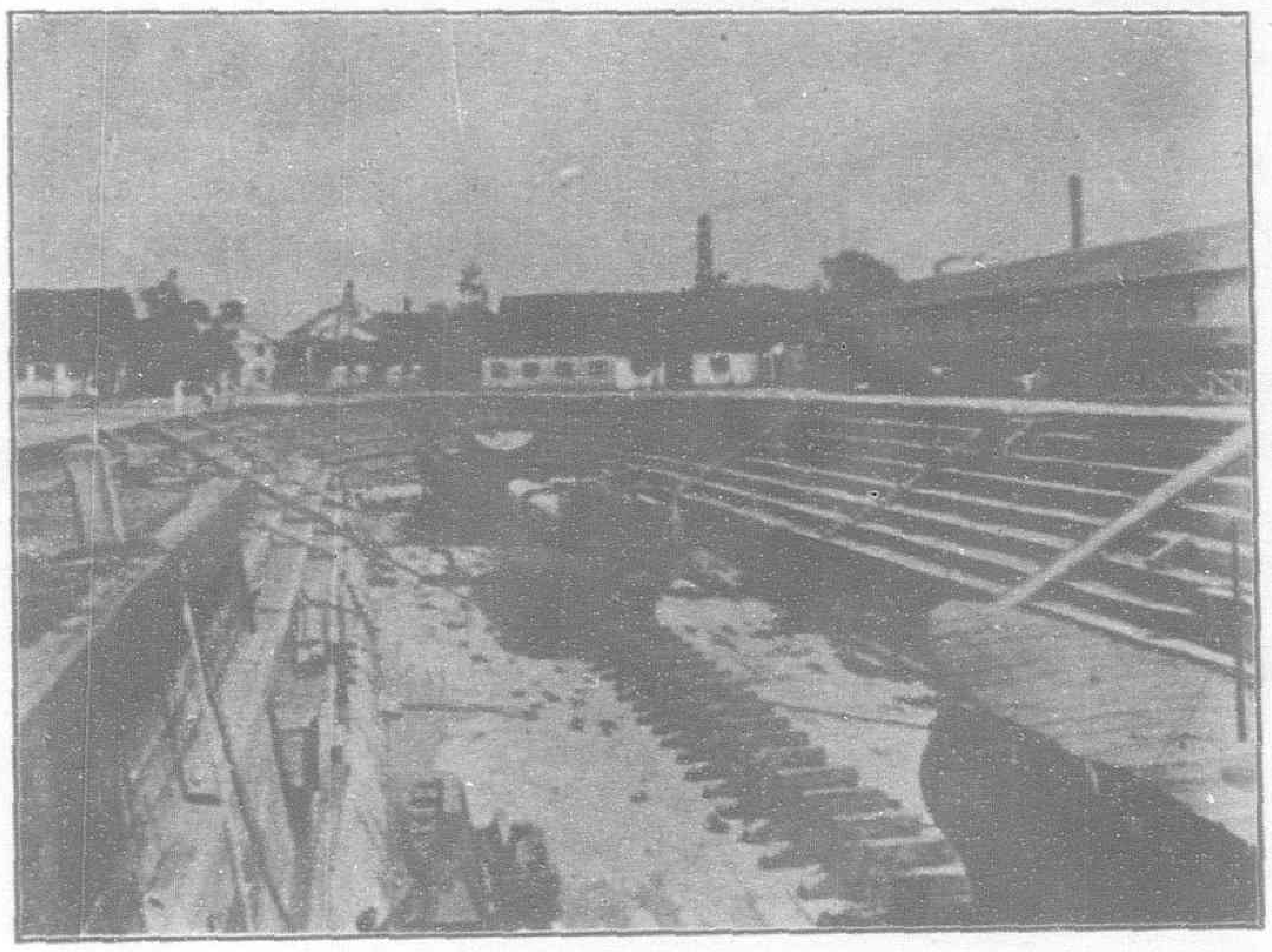
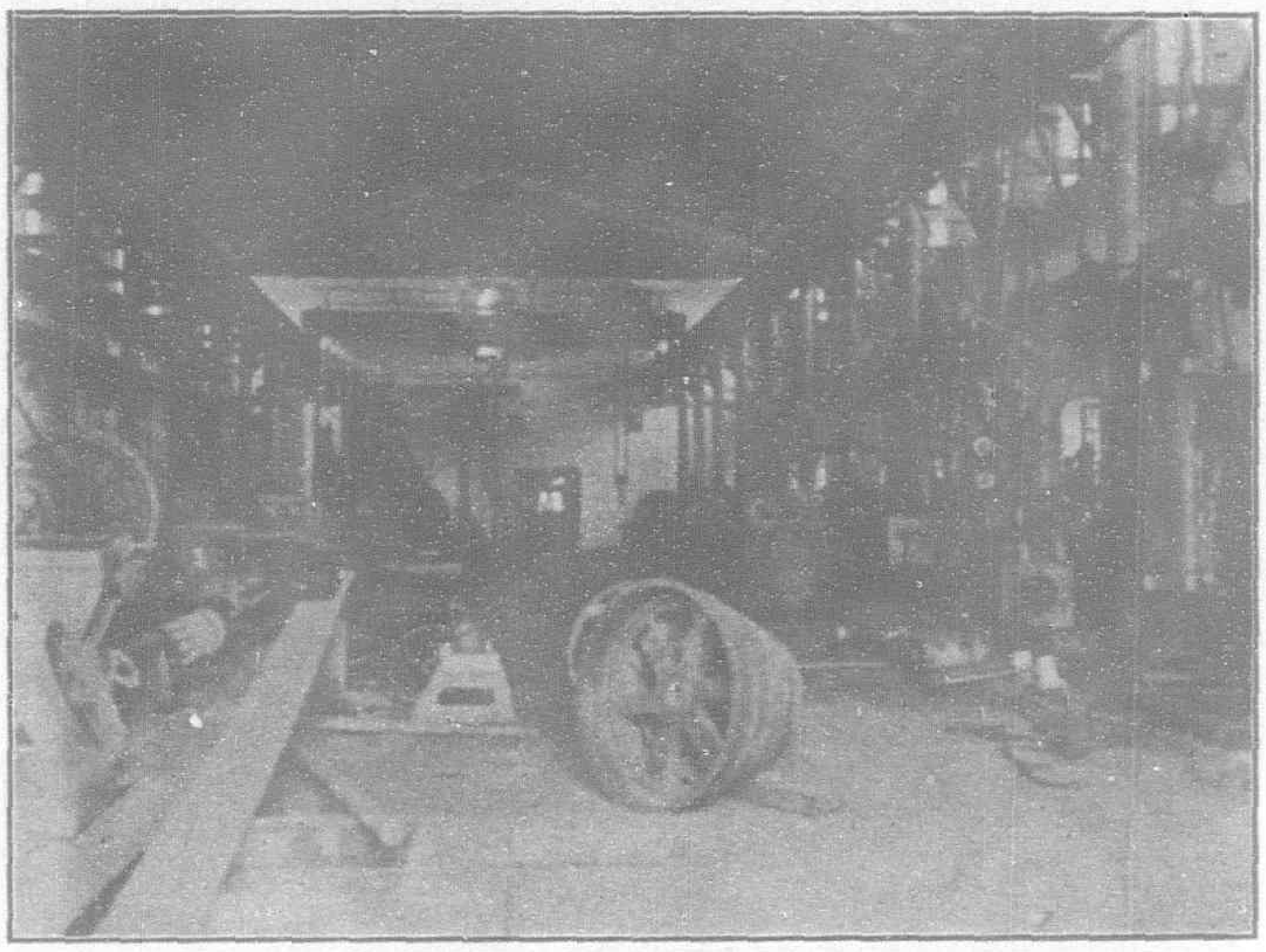
KIANGNAN

DOCK AND ENGINEERING WORKS





KIANGNAN DOCK—Length over all, 385′; length on blocks, 375′; water on sill, 19′; dock entrance, top, 70′, bottom, 60′.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal any this side of Suez.

Patent slipway for small steamers and launches. Complete boat and launch building shops.

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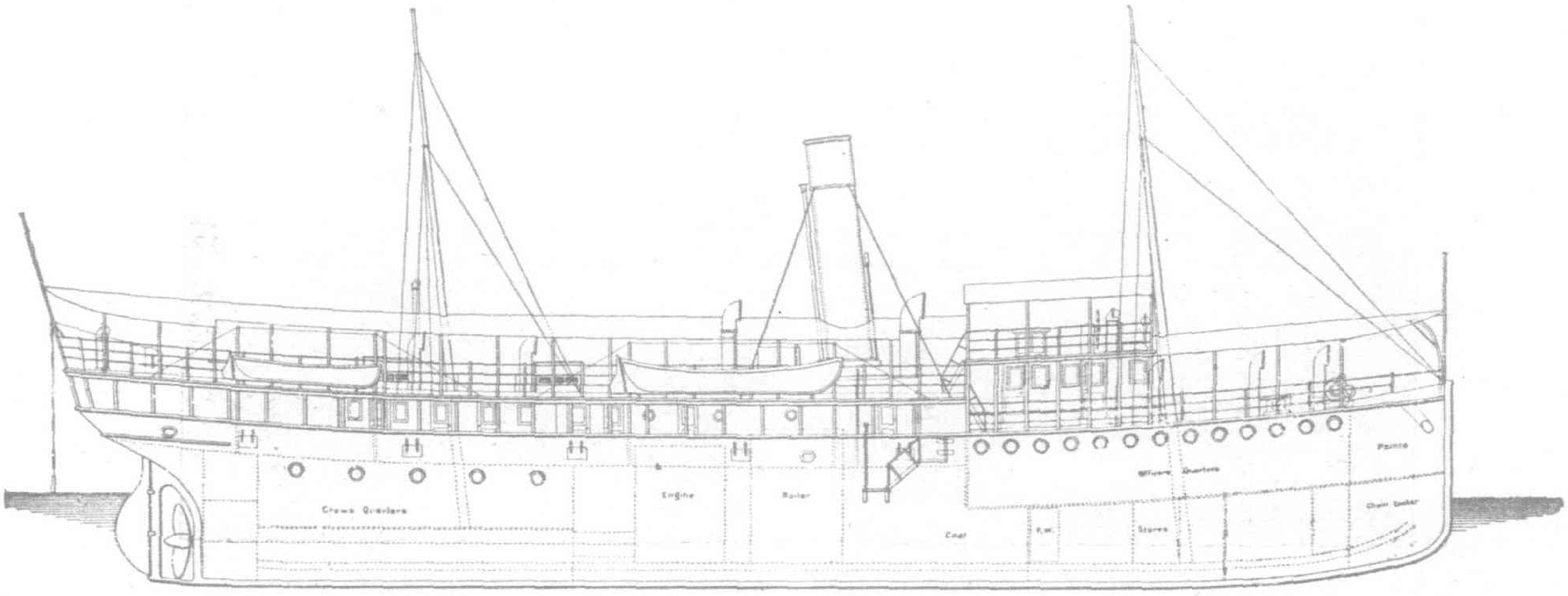

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The Company has SIX GRANITE DOCKS and TWO PATENT SLIPS of the following dimensions:—

NAME OF DOCK OR SLIP	LENGTH ON KEEL BLOCKS	BREADTH AT ENTRANCE	DEPTH OVER SILL AT ORDINARY SPRING TIDES	RISE OF TIDE	
				SPRINGS	NEAPS
KOWLOON	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
No. 1 Dock, Kowloon.........	576	86 feet top 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon.........	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.........	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85′ 6″	20′	7′ 6″	—
ABERDEEN					
Hope Dock..................	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

The DOCKS are fitted with every appliance in the way of Caissons powerful Centrifugal Steam Pumps, etc., which enable them to be pumped out in three hours.

WORKSHOPS.—The extensive workshops on the premises at Kowloon, Cosmopolitan, and Aberdeen Docks possess every facility and appliance necessary for the repairs of ships and steam machinery. The Engineers' Shops are supplied with a large plant of the latest types of tools in the way of Lathes, Planing, Milling and Screwing Machines, Electric Cranes, etc., etc., and capable of executing the largest class of work with despatch. The Shipwrights' Department has attached to it a Steam-Sawmill with Circular, Vertical and Band Saws, and also a complete plant of Wood-working Machinery of the most modern and improved type. The Blacksmiths' Shops are equally well furnished with a complete supply of powerful Steam Hammers, Cranes, etc., capable of forging stern posts and crank and straight shafting of the largest size.

Powerful Lifting Shears with steam purchase at two of their Establishments stand on a solid granite seawall, alongside which vessels can lie drawing 24 feet of water, and take in or out boilers, etc. The Shears at Kowloon are capable of lifting 70 tons.

The Company is prepared to tender for the construction of new vessels in either steel, iron or wood, having already built about 400 of varying sizes up to 3,000 tons; also to execute all kinds of ship work at lower rates and with greater despatch than any establishment in the East. Every department is under the close supervision of experienced European foremen.

SHIP-YARD is fully equipped with modern plant, including hydraulic flanging and bending machines, electrically driven rolls, punching, shearing, angle-bevelling, joggling and planing machines, capable of dealing with the heaviest class of work.

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FOUNDRY.—The Foundry is fitted with a large powerful Steam Crane and the Cupolas are capable of casting up to 100 tons. The Company is prepared to supply the very best iron and Brass Castings of all descriptions upon the shortest notice.

GALVANIZING PLANT of the most modern type by electrical deposit has been put up at the Kowloon Establishment, which is capable of doing the largest class of work.

STORES.—The Company's Godowns contain large and well-selected stocks of all material and fittings requisite in shipbuilding, engine-room outfits furnishings, and ships' stores of all descriptions supplied at tariff rates.

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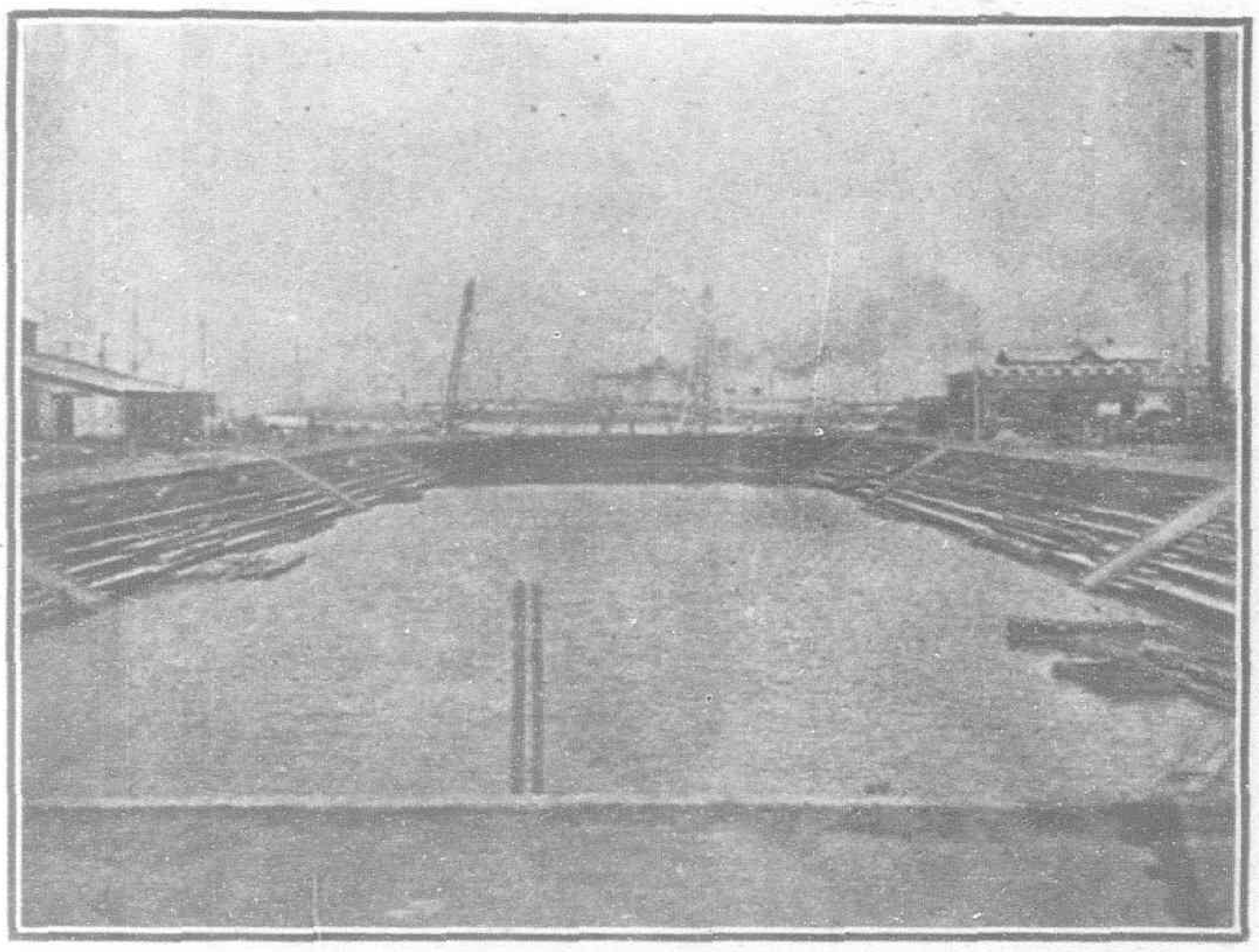
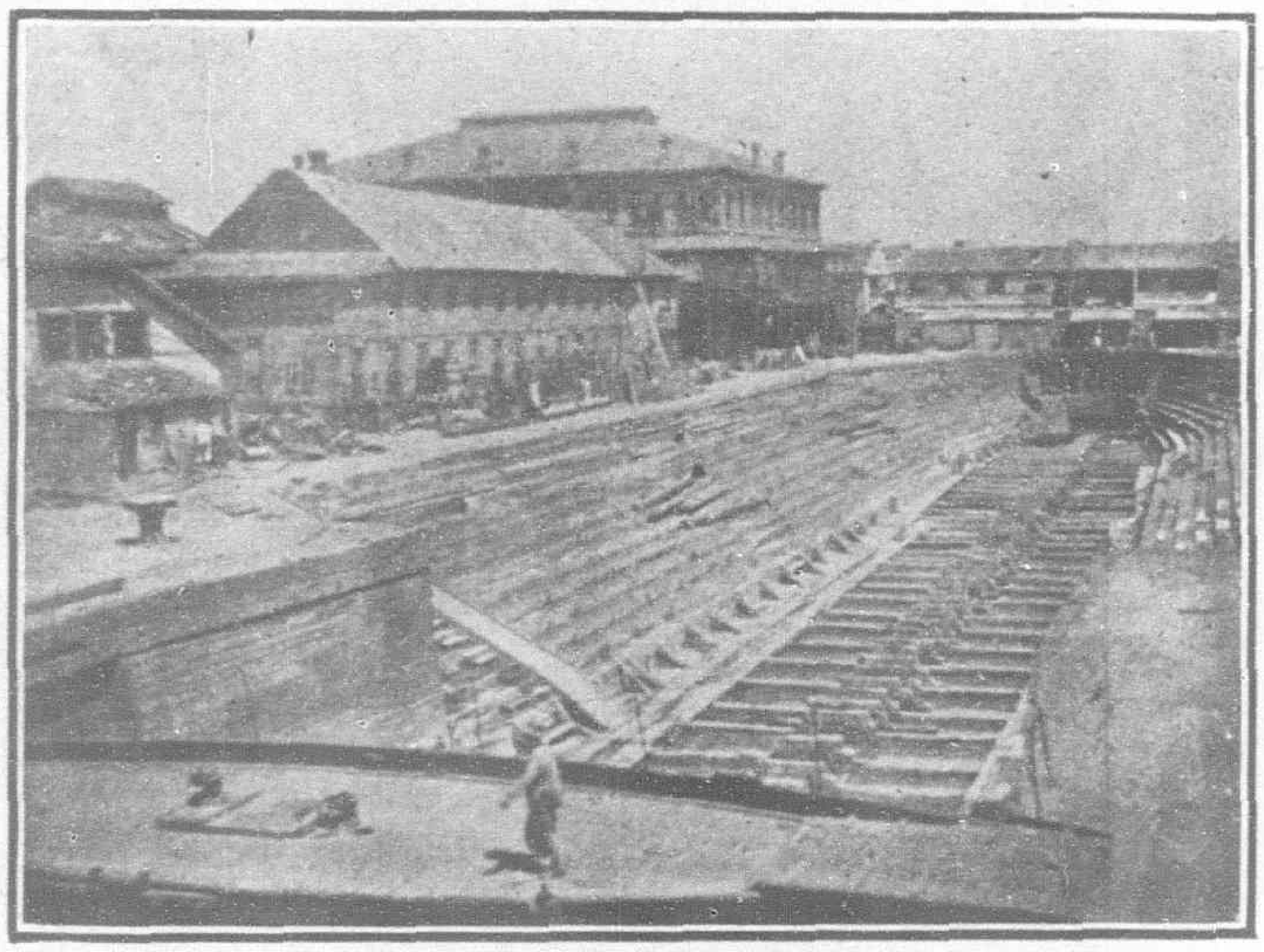


COSMOPOLITAN DOCK AT POOTUNG



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The Docks are five in number ranging in length from 360 feet to 560 feet, and breath of entrance from 57 feet to 83 feet, with the depth of water on the sill from 16 feet to 24 feet.

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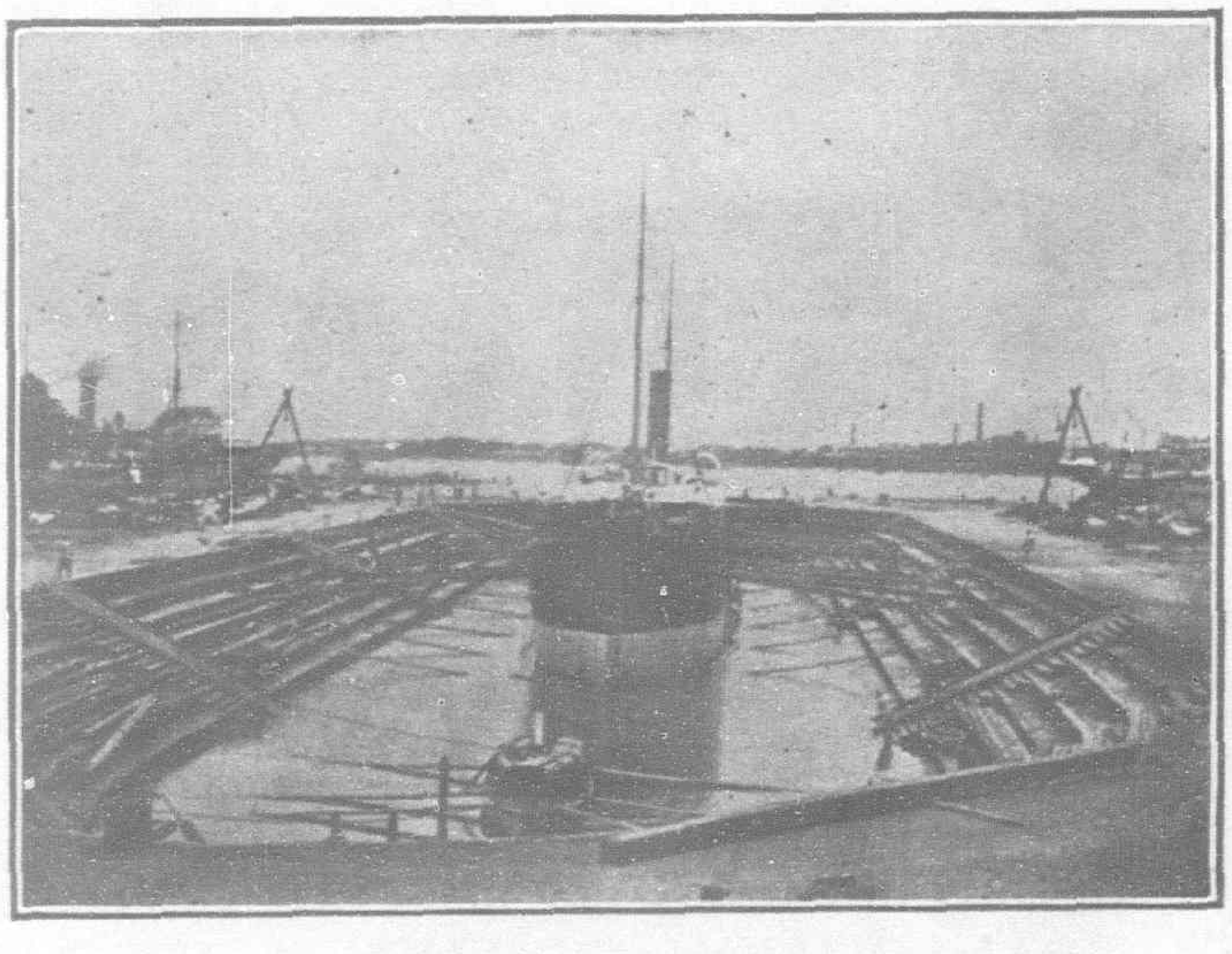

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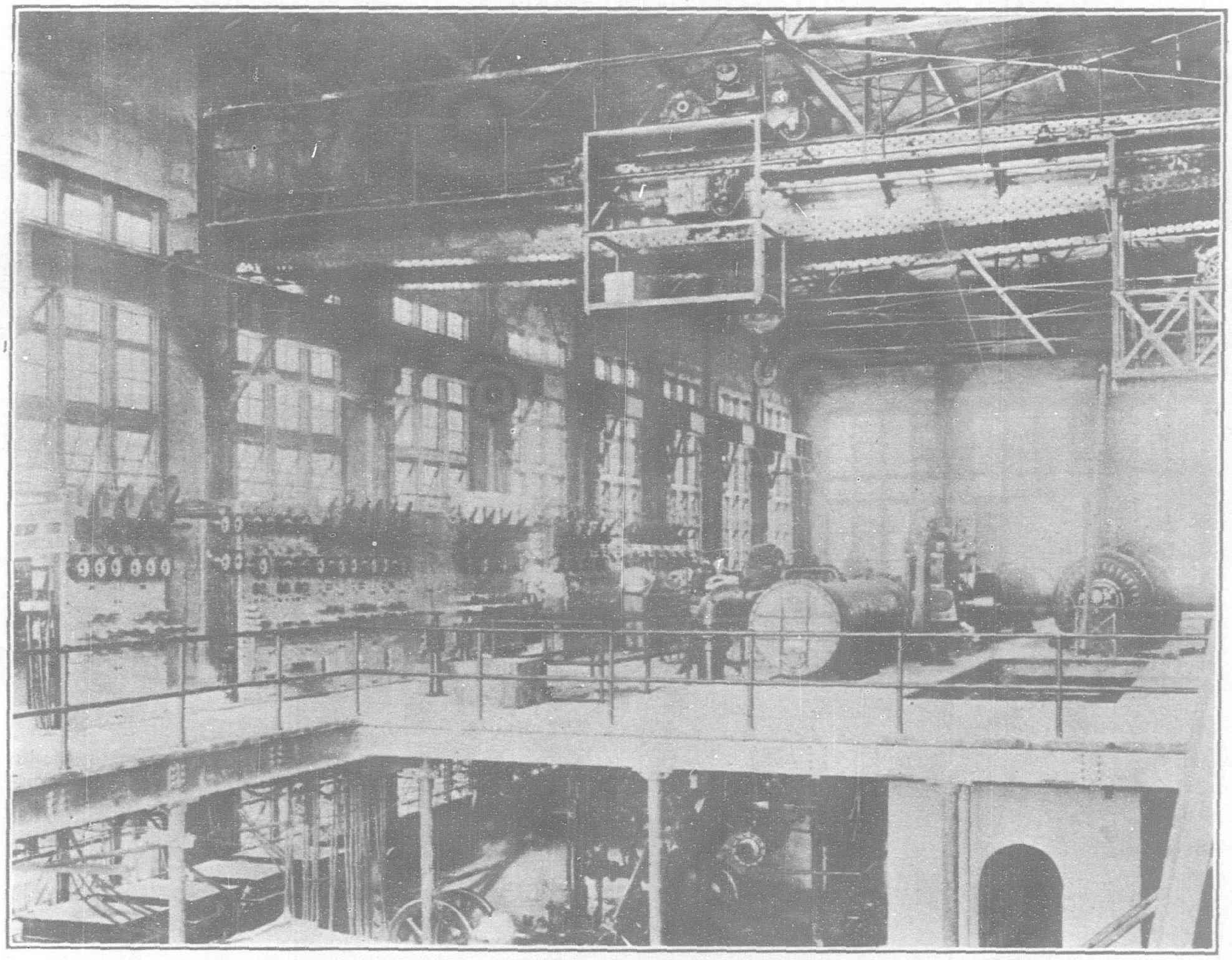

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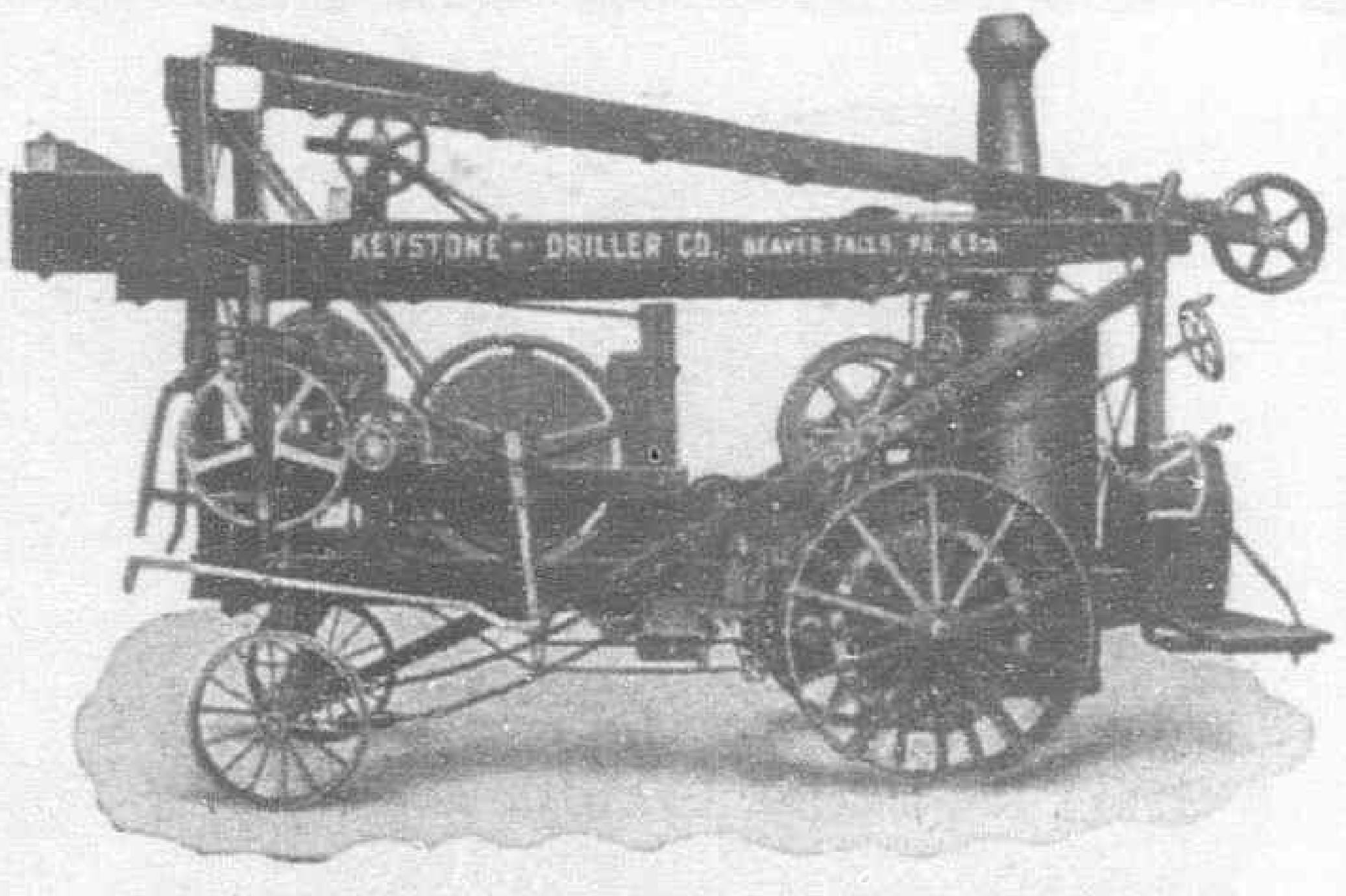
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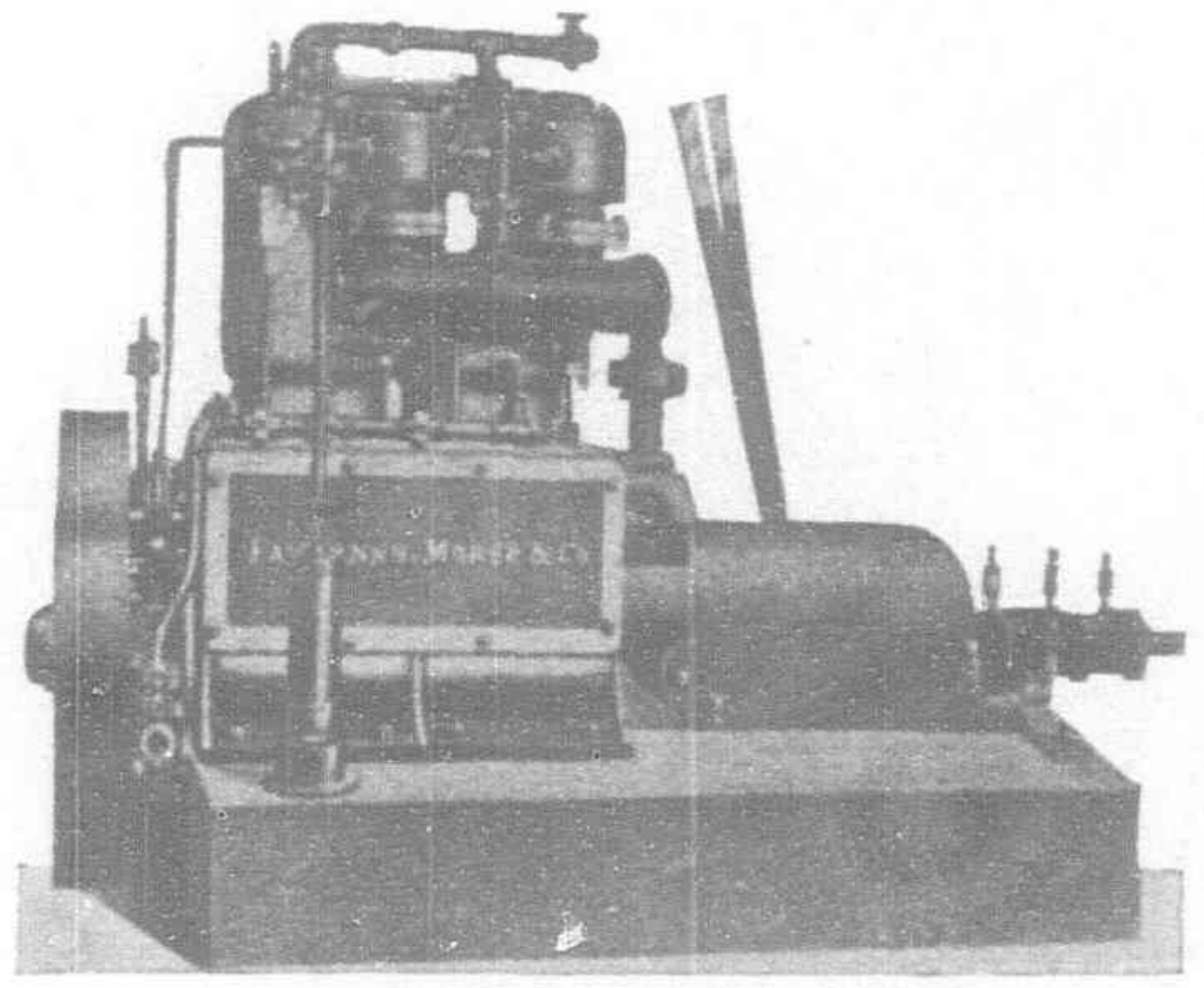
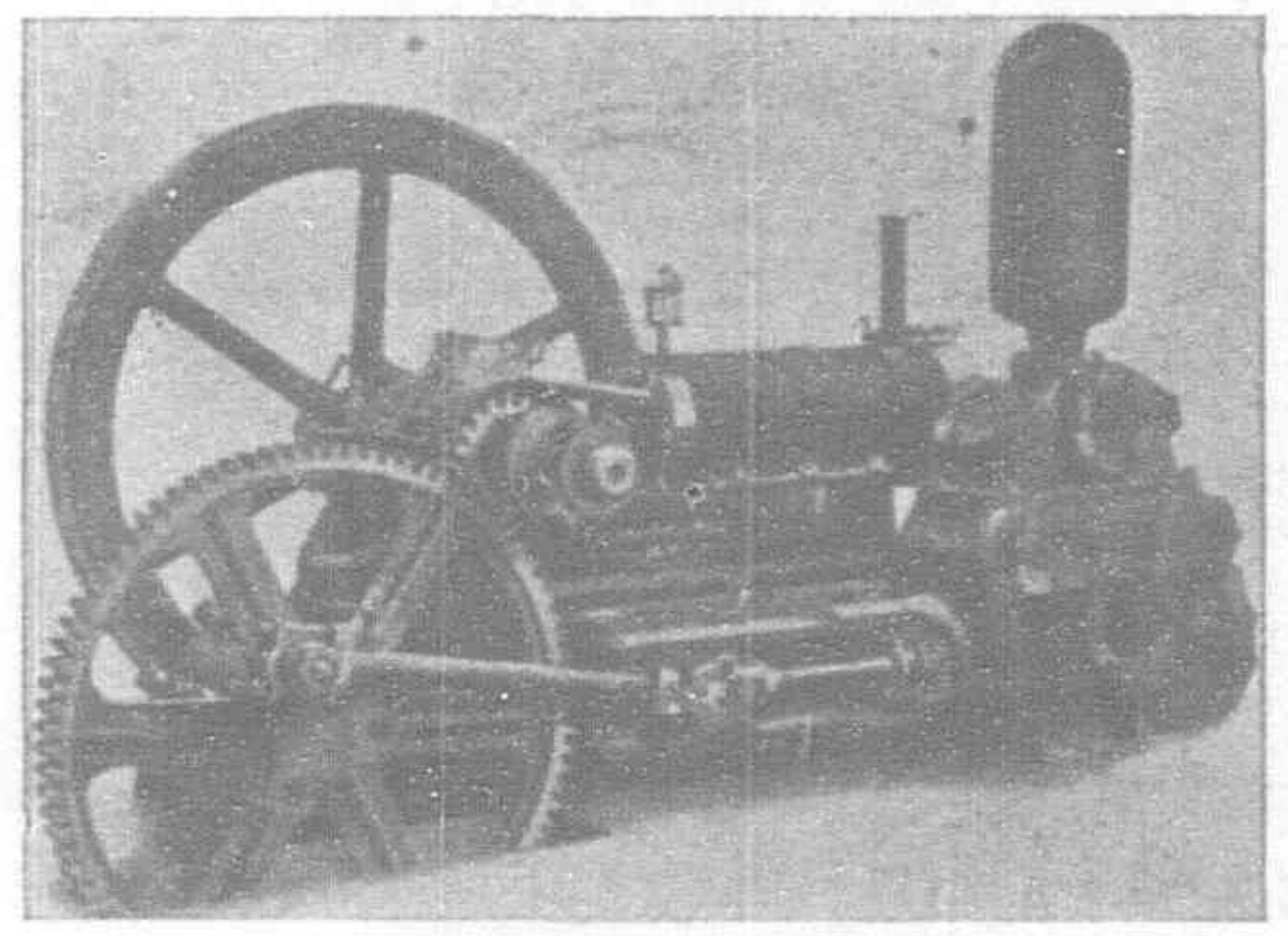

MARINE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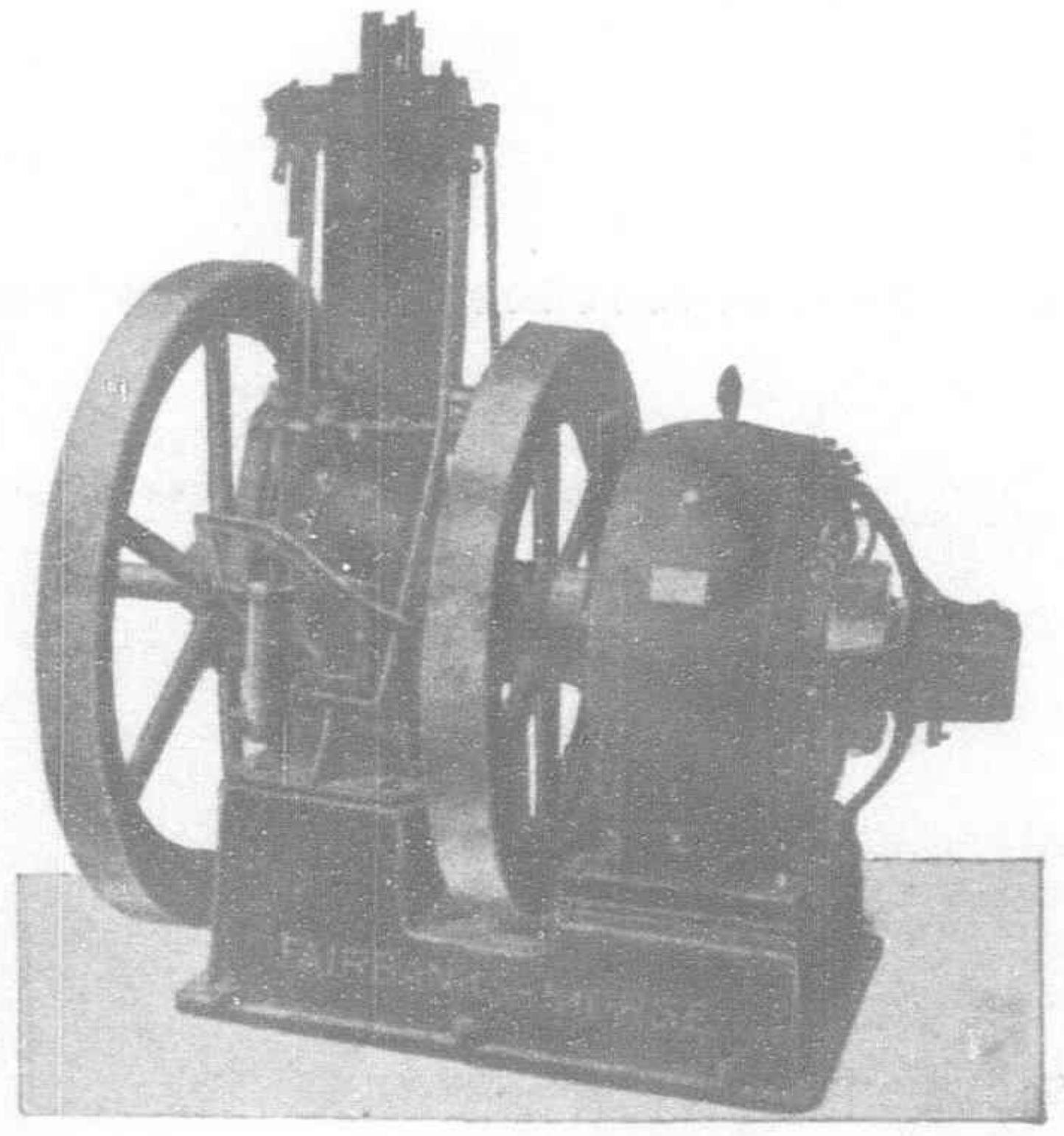
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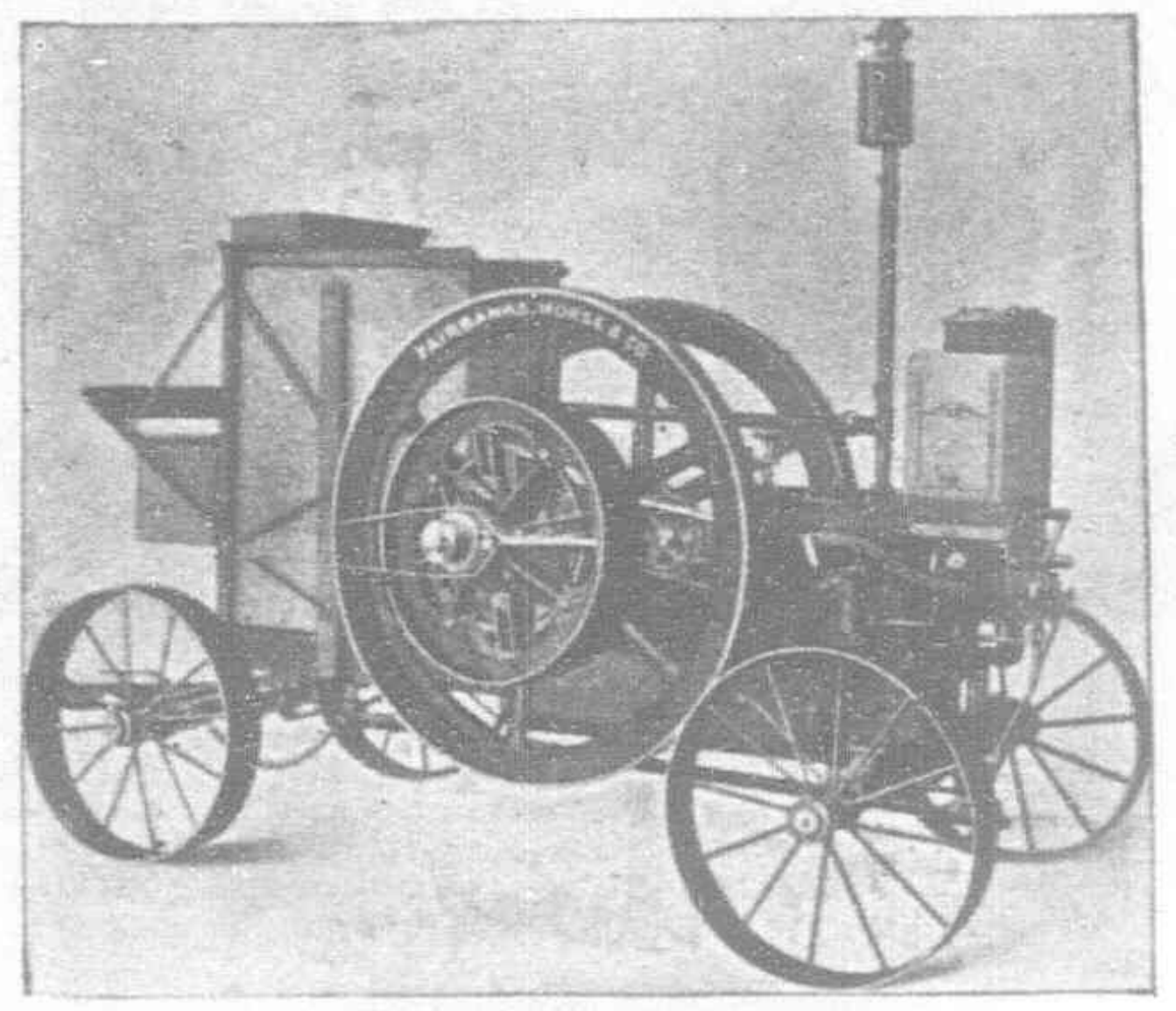
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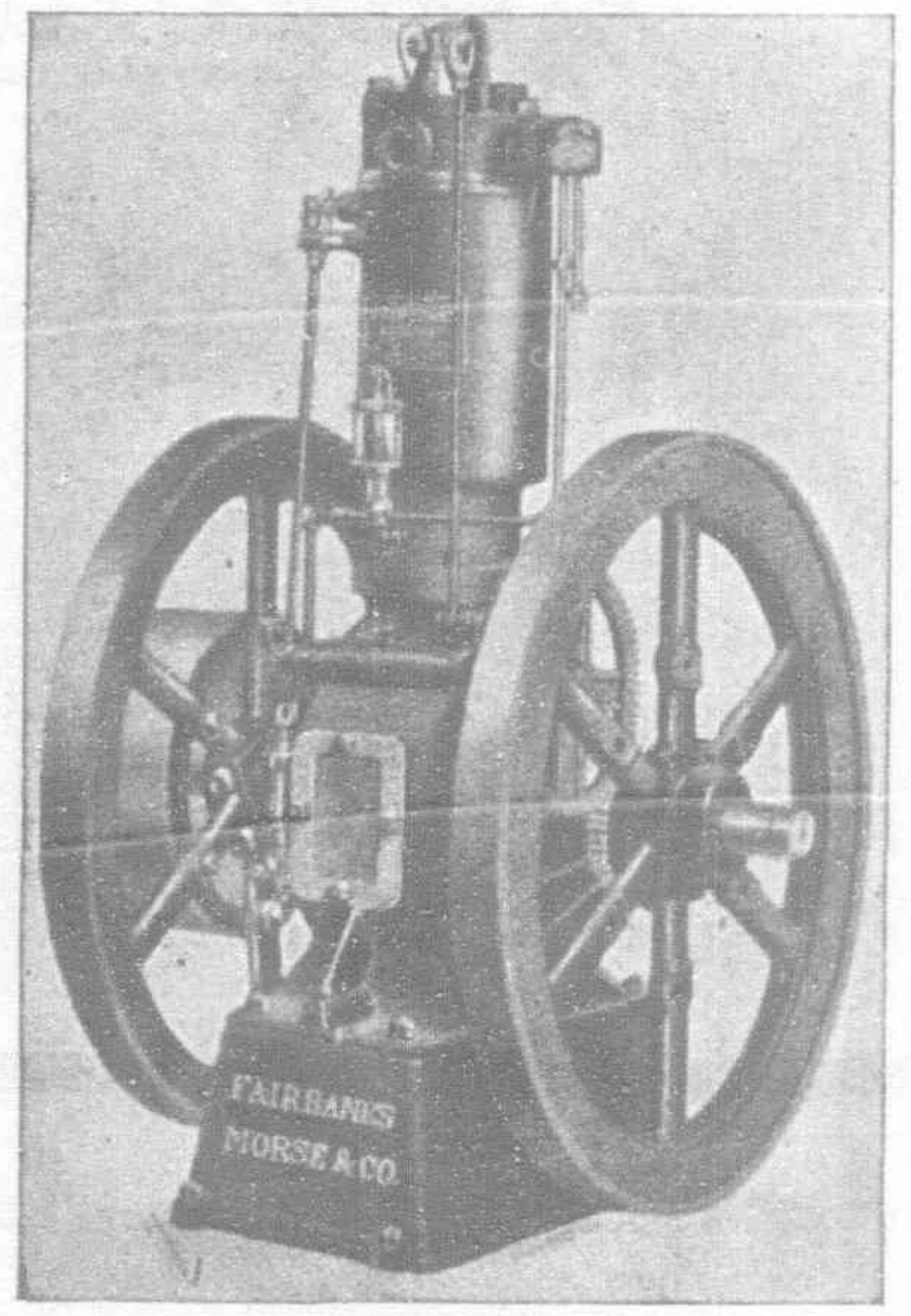
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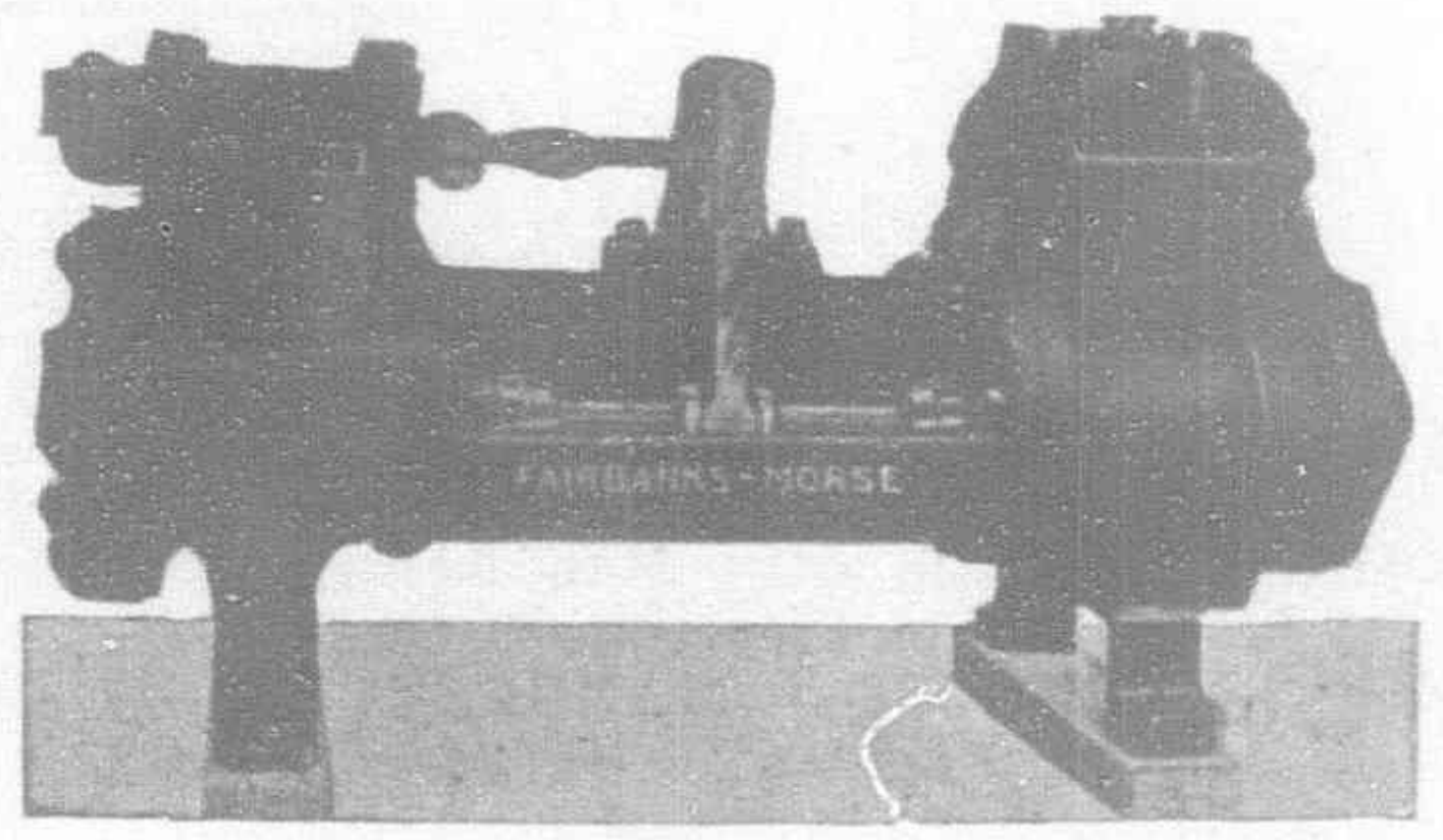
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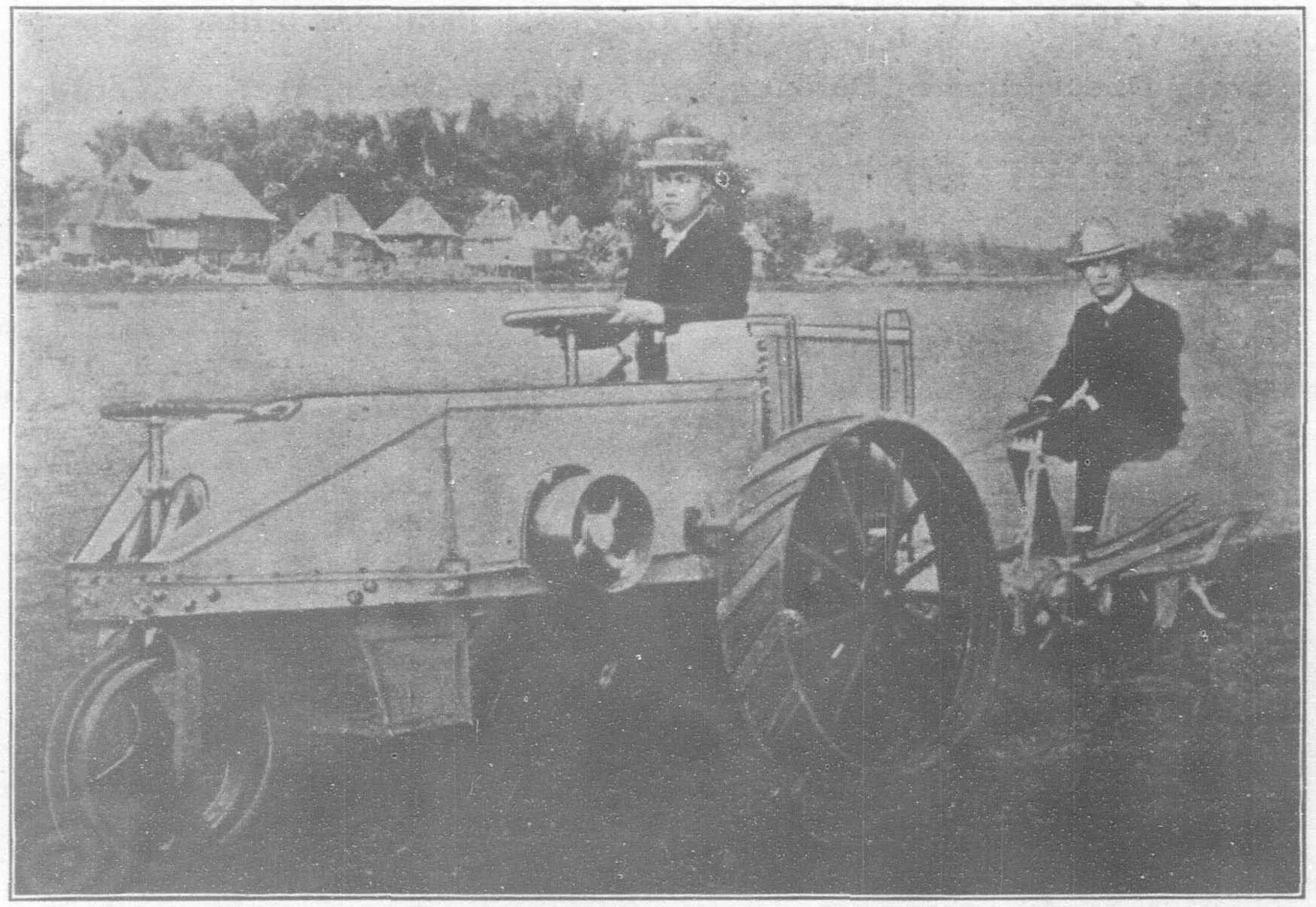

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(a) When delivered by the contractor to the company and inspected by it in its material yards or on its rights-of-way, one peso and sixty centavos (₱1.60) for each specification tie.

(b) When delivered by the contractor to the company on board vessel or lighter after being duly inspected by it at some agreed upon accessible point on the coast line or at a harbor of any of the islands from where they can be safely put aboard for shipment, one peso and thirty centavos (₱1.30) for each specification tie.

The company under invitation (a) will accept any number of ties above ten.

Under invitation (b) any number exceeding one thousand.

The company will make contracts to take an agreed number at these prices at any time during the year 1907, but will not accept any without a contract executed with the party offering.

The company asks no penalty for failure of the contractor to furnish the number he agrees to furnish, giving each contractor the opportunity to cancel his contract at any time he finds the price unprofitable. The principal object of the contract, outside of the requirement of compliance with the specifications, is to keep the chief engineer informed as to who is making the ties and the quantity the contractor is likely to be able to supply.

THE PHILIPPINE RAILWAY COMPANY is, under Act No. 1497, exempt from the payment of any tax on timbers cut from Philippine Public Lands required by it in the construction of its railways; hence, the maker is exempt from timber tax when cutting timber for railroad purposes under licences, issued by the Bureau of Forestry. Before any ties will be accepted the contractor or maker must show that the ties are free from debt.

For further information, copy of contract and specifications, address or call on any of the following:
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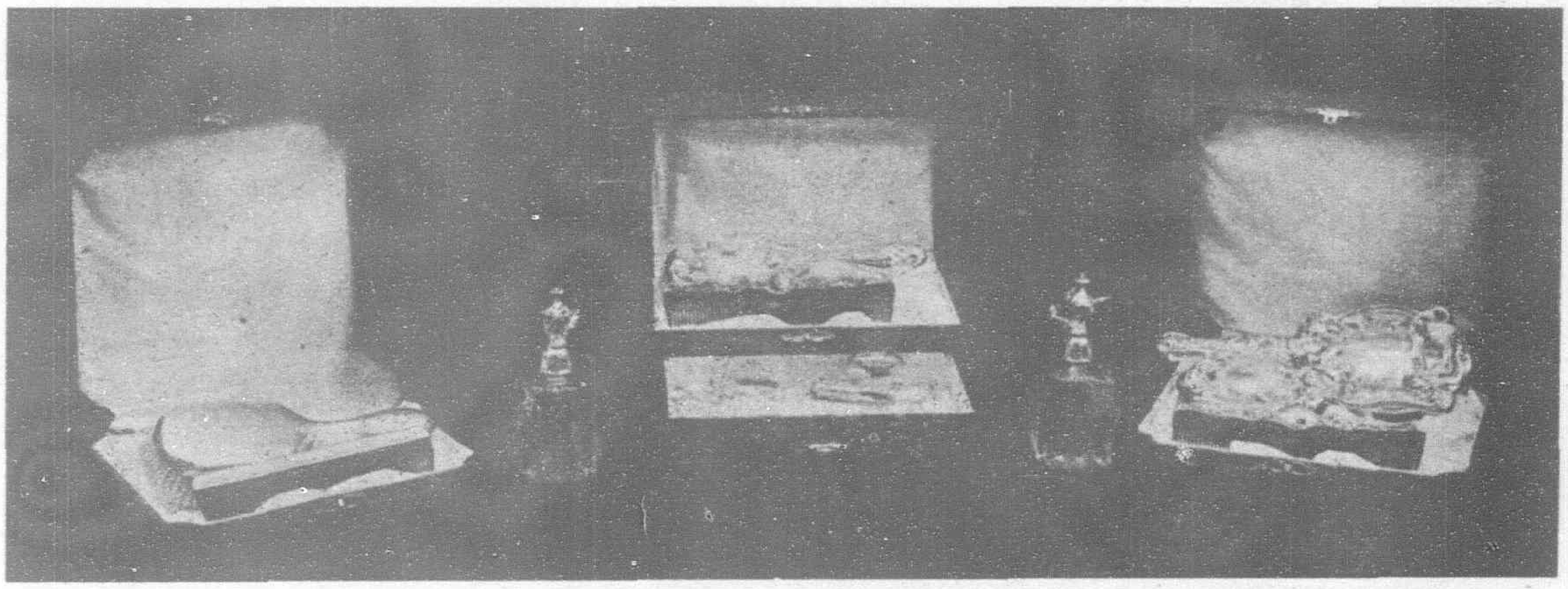

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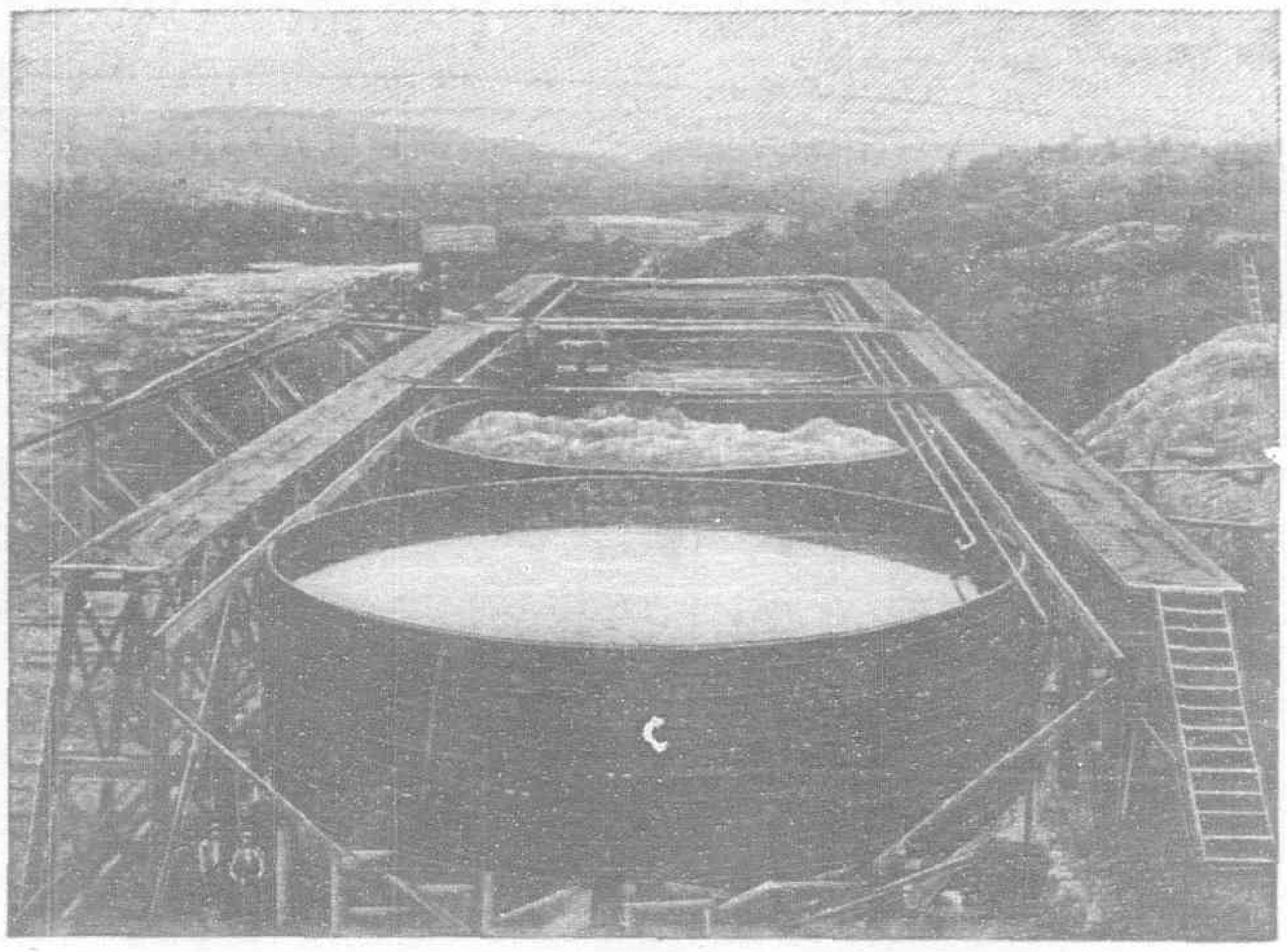

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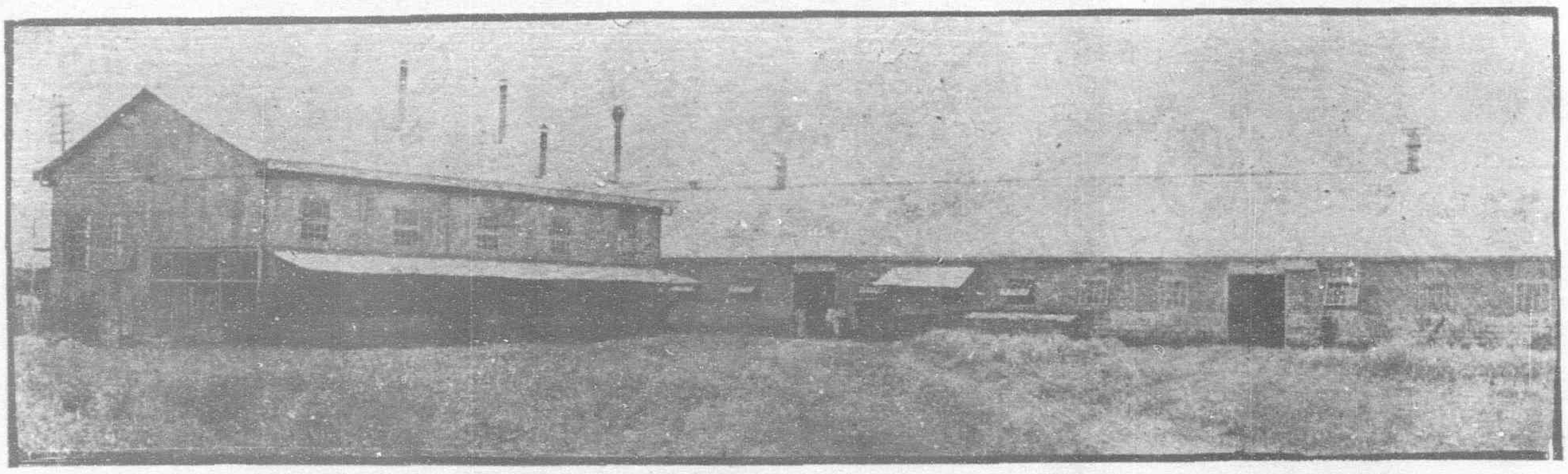

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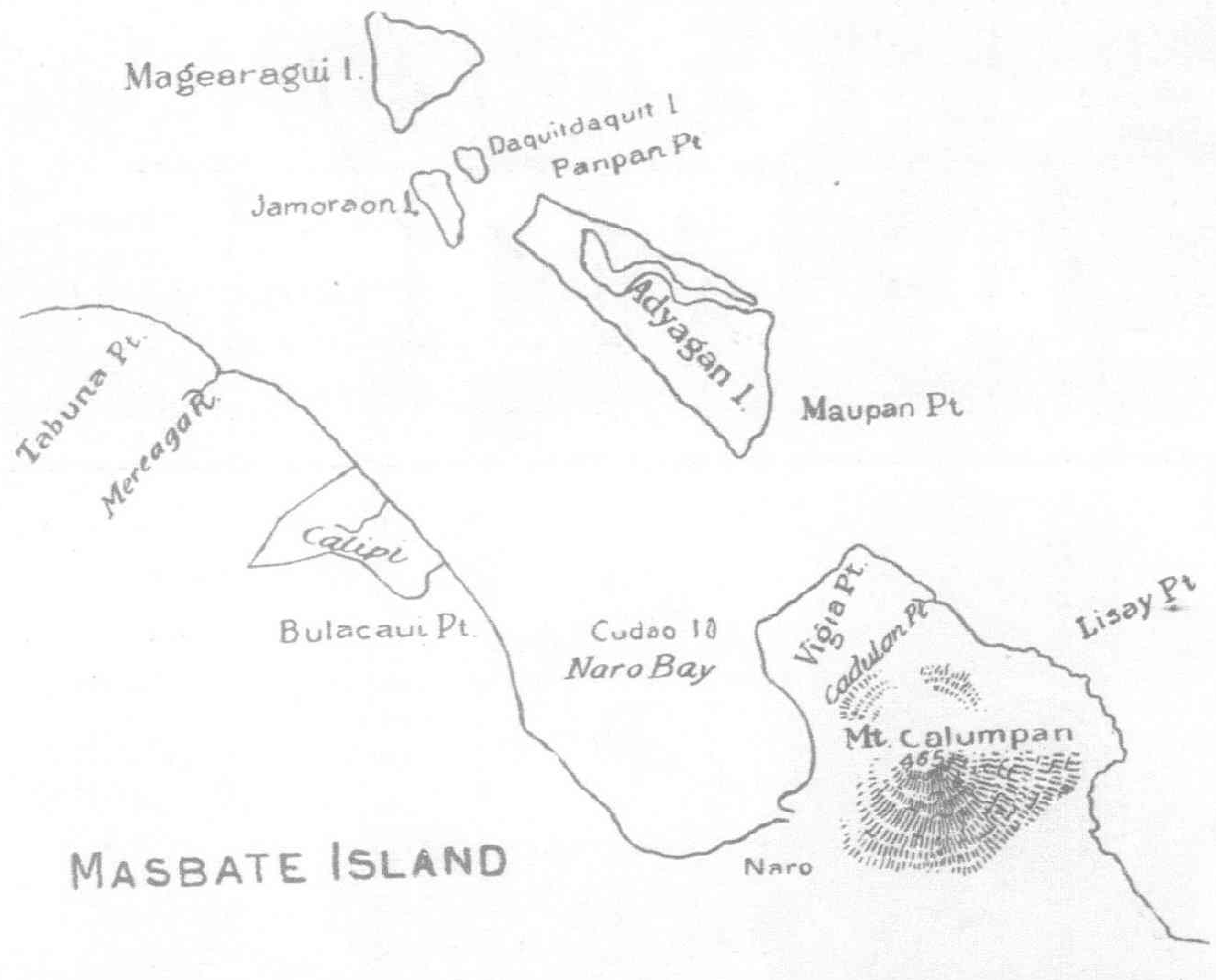

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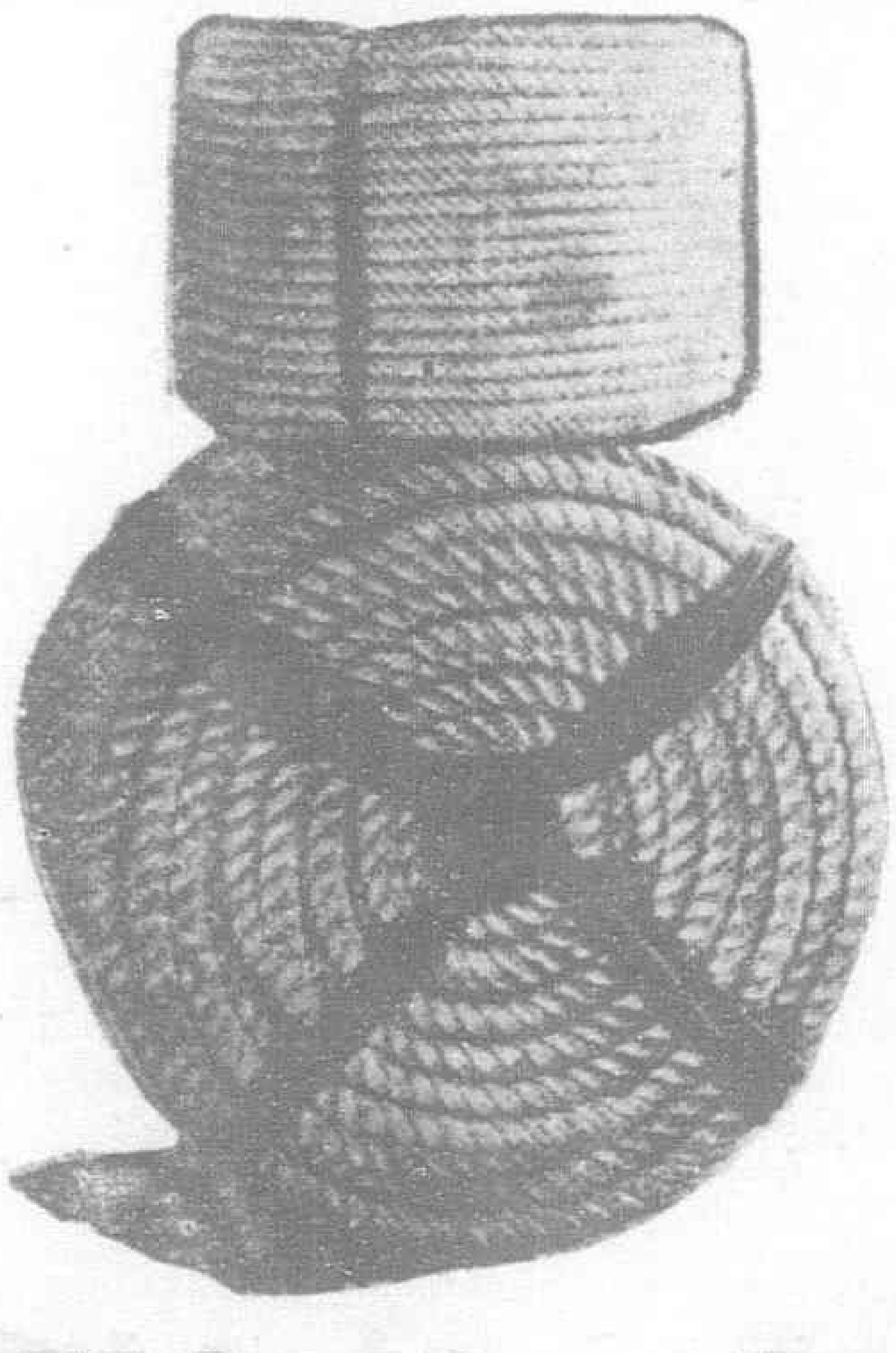

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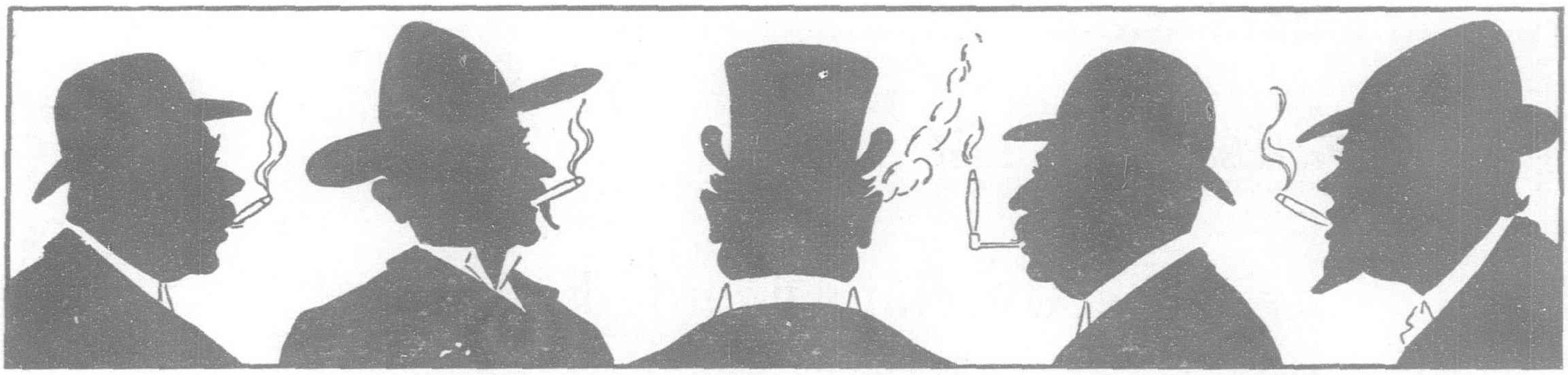

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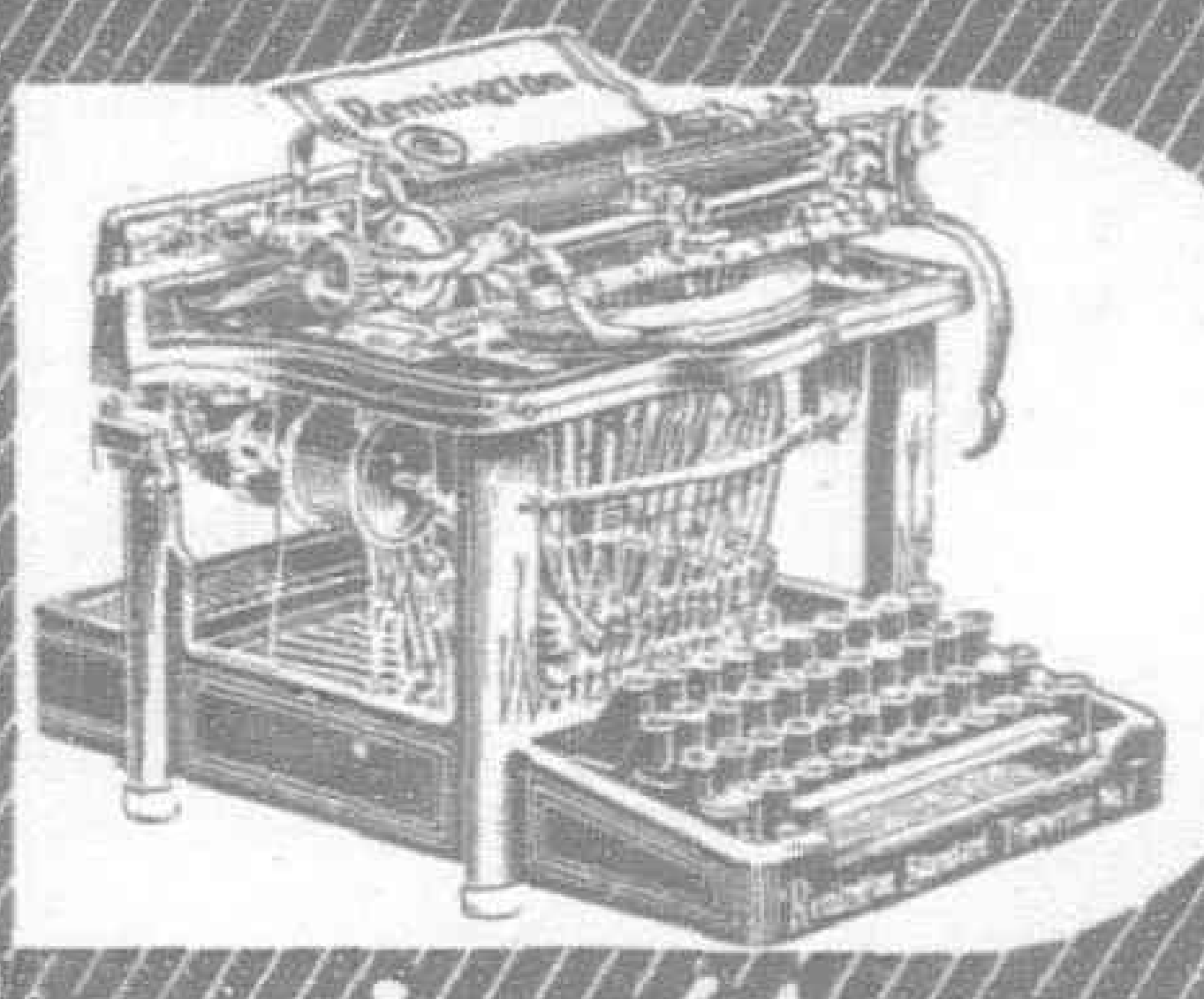

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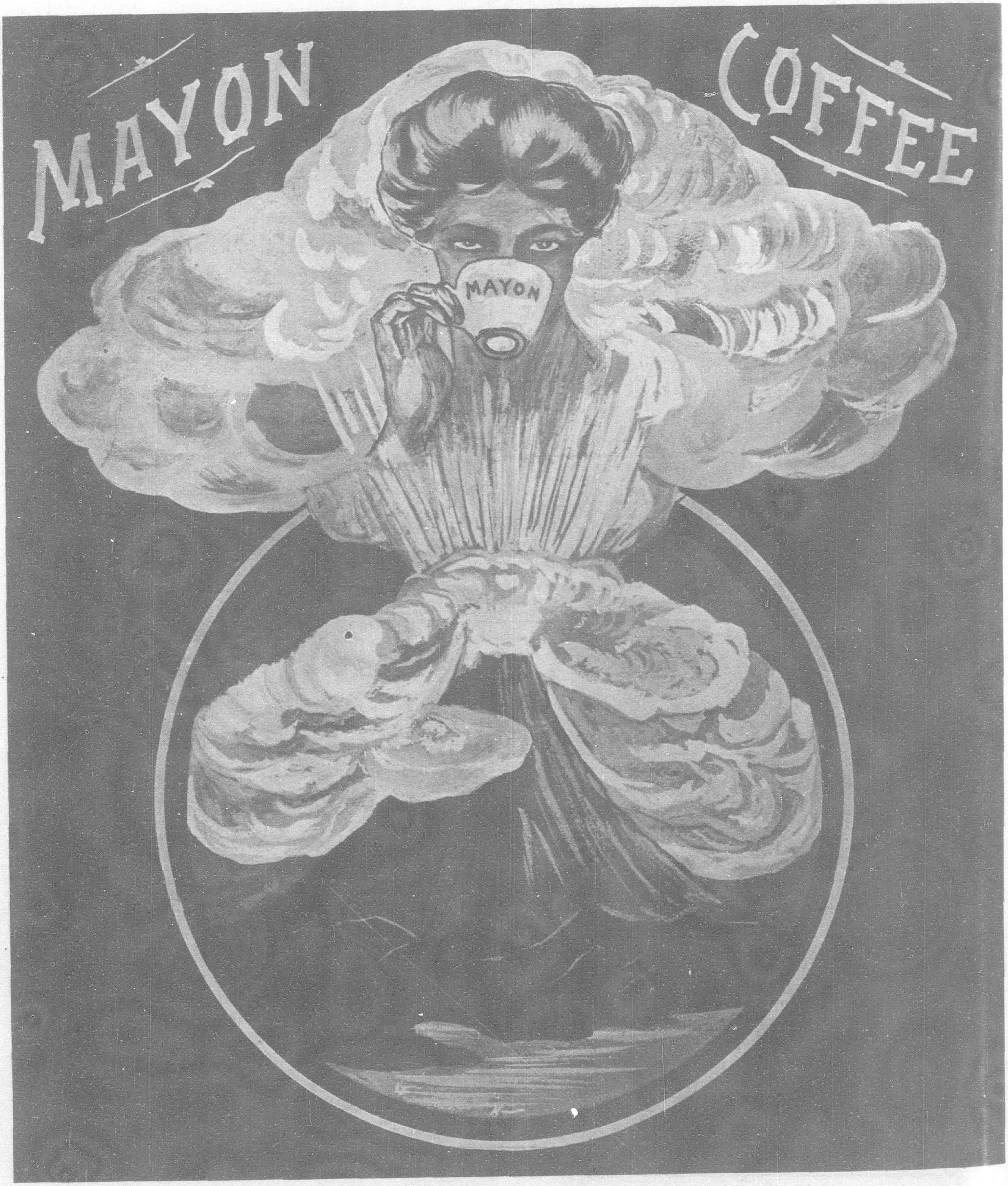

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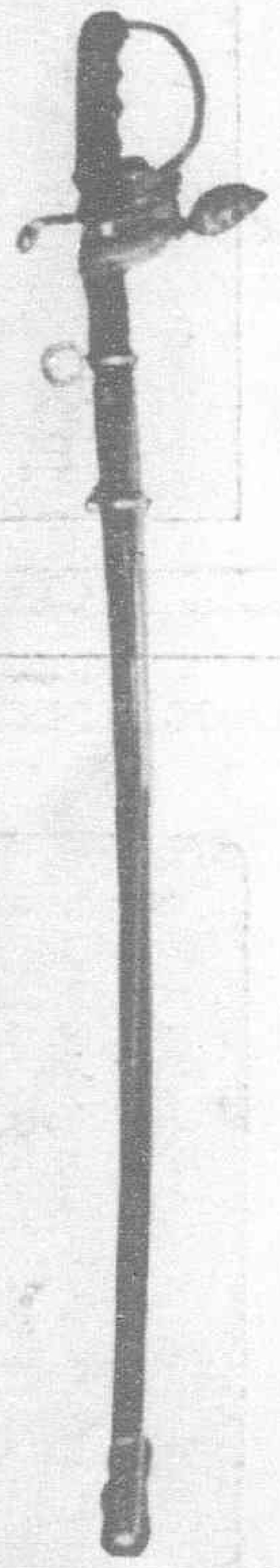

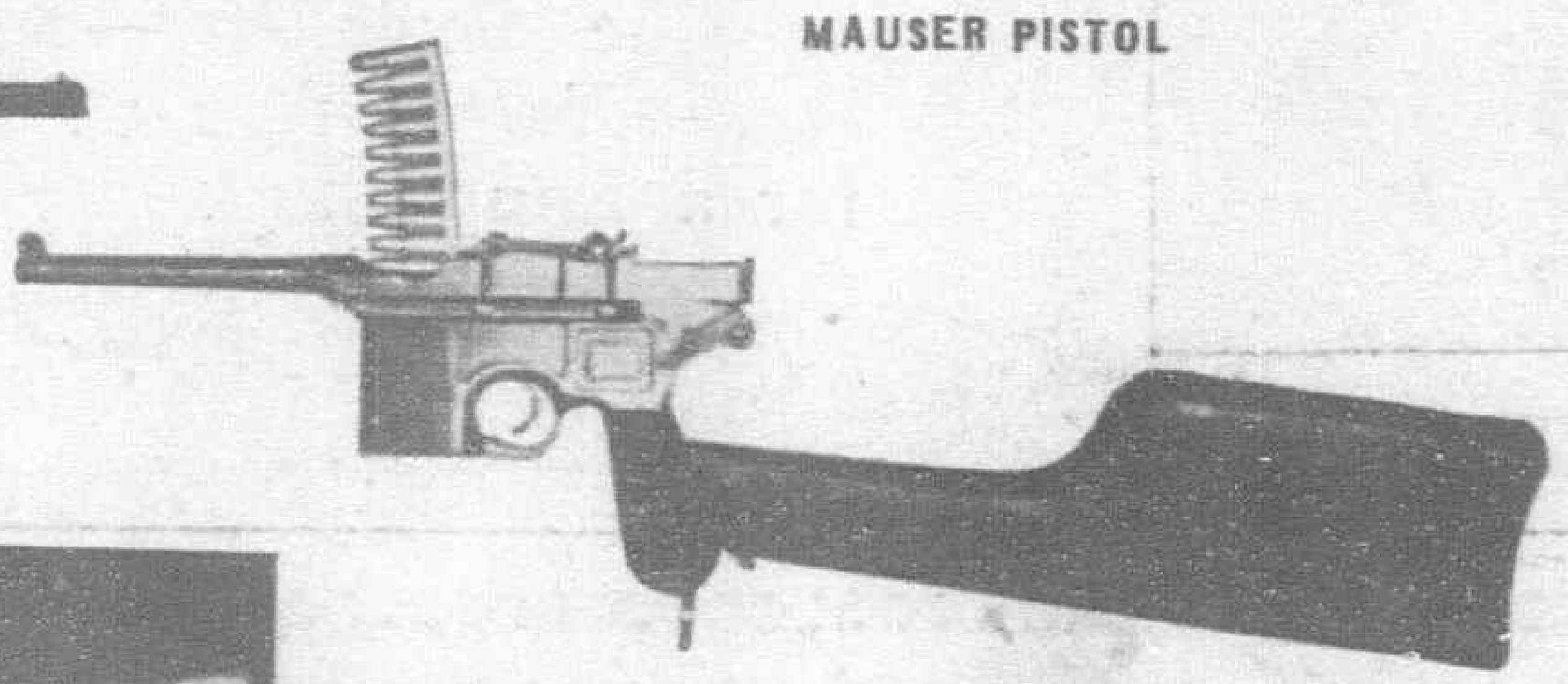

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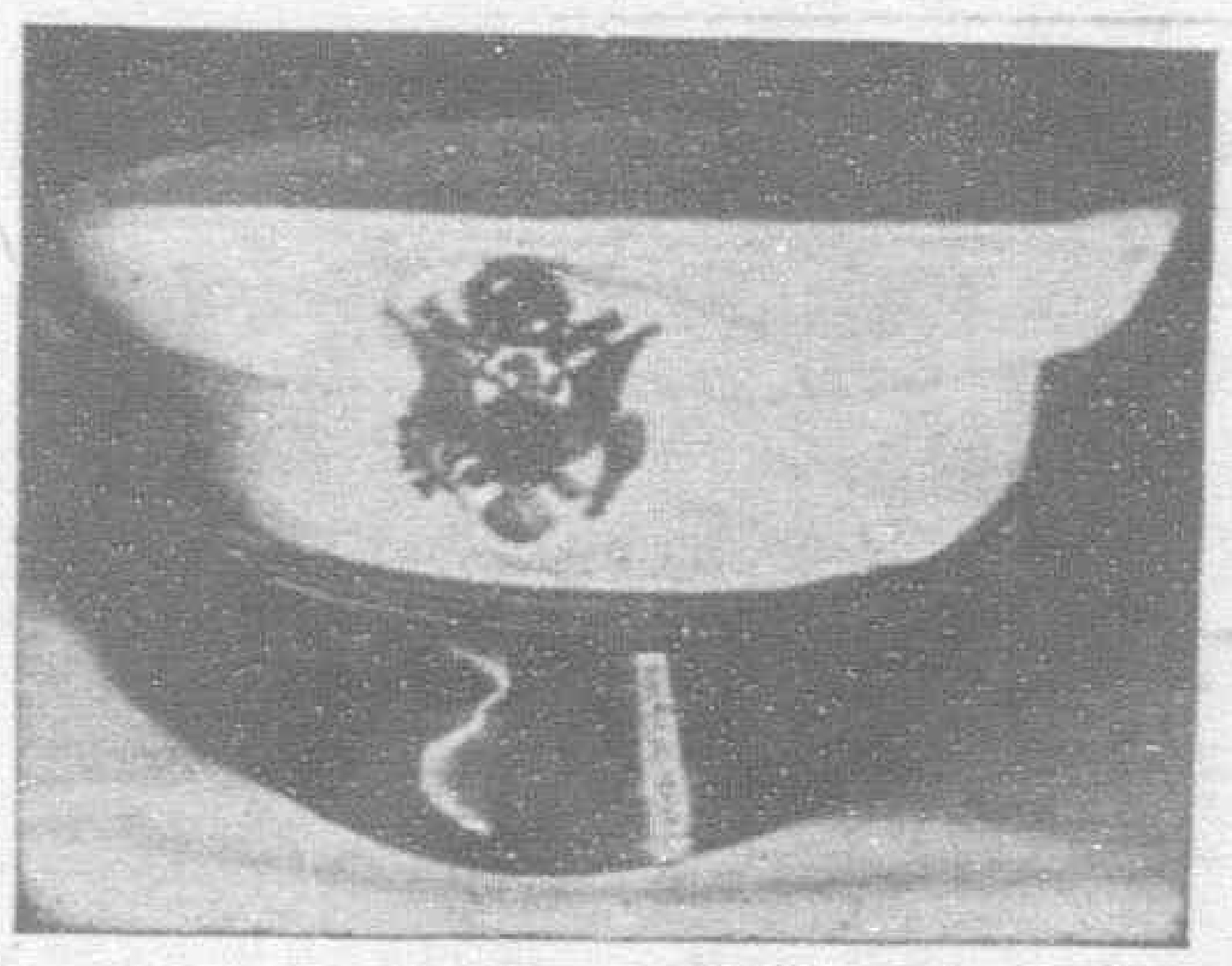

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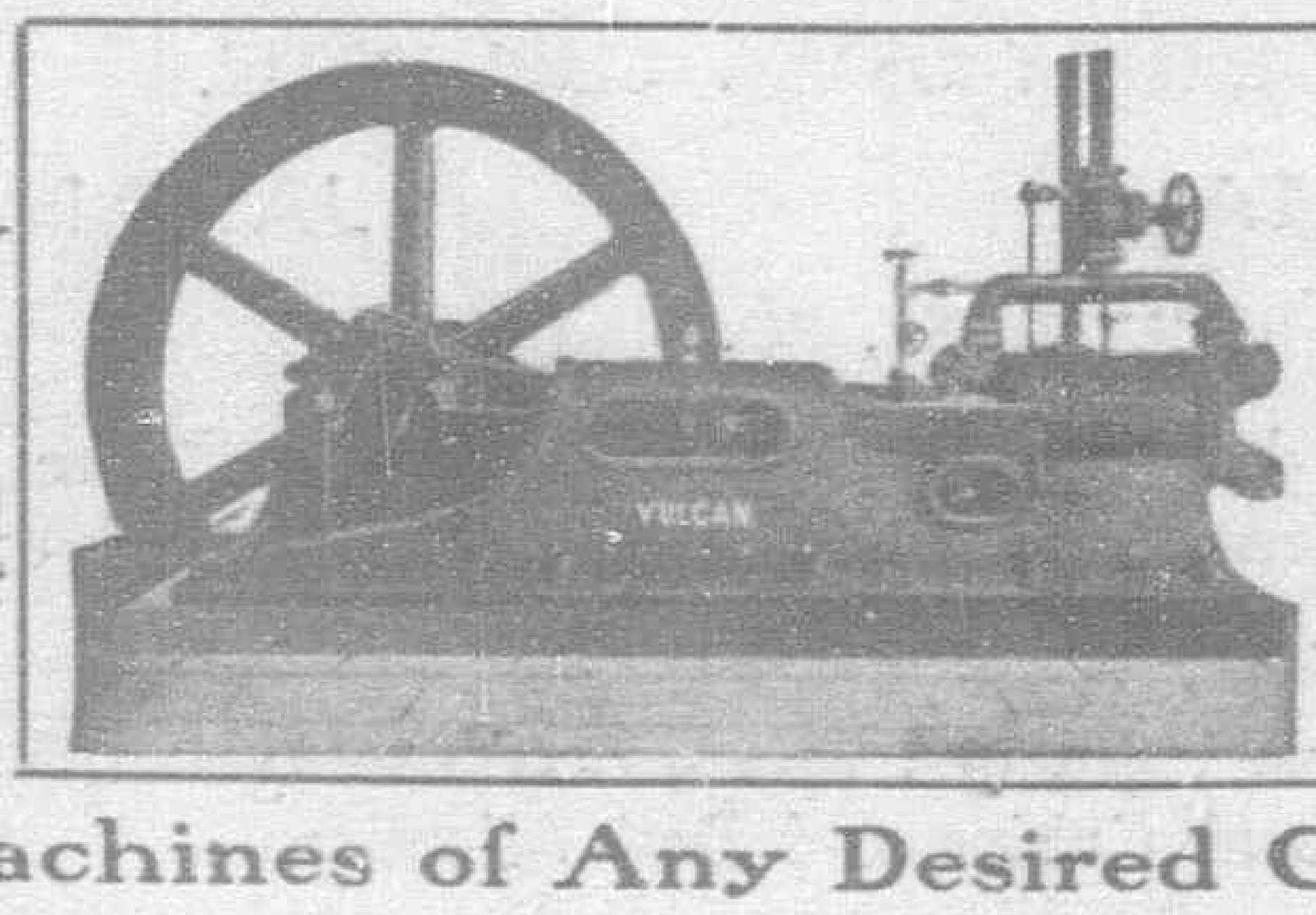

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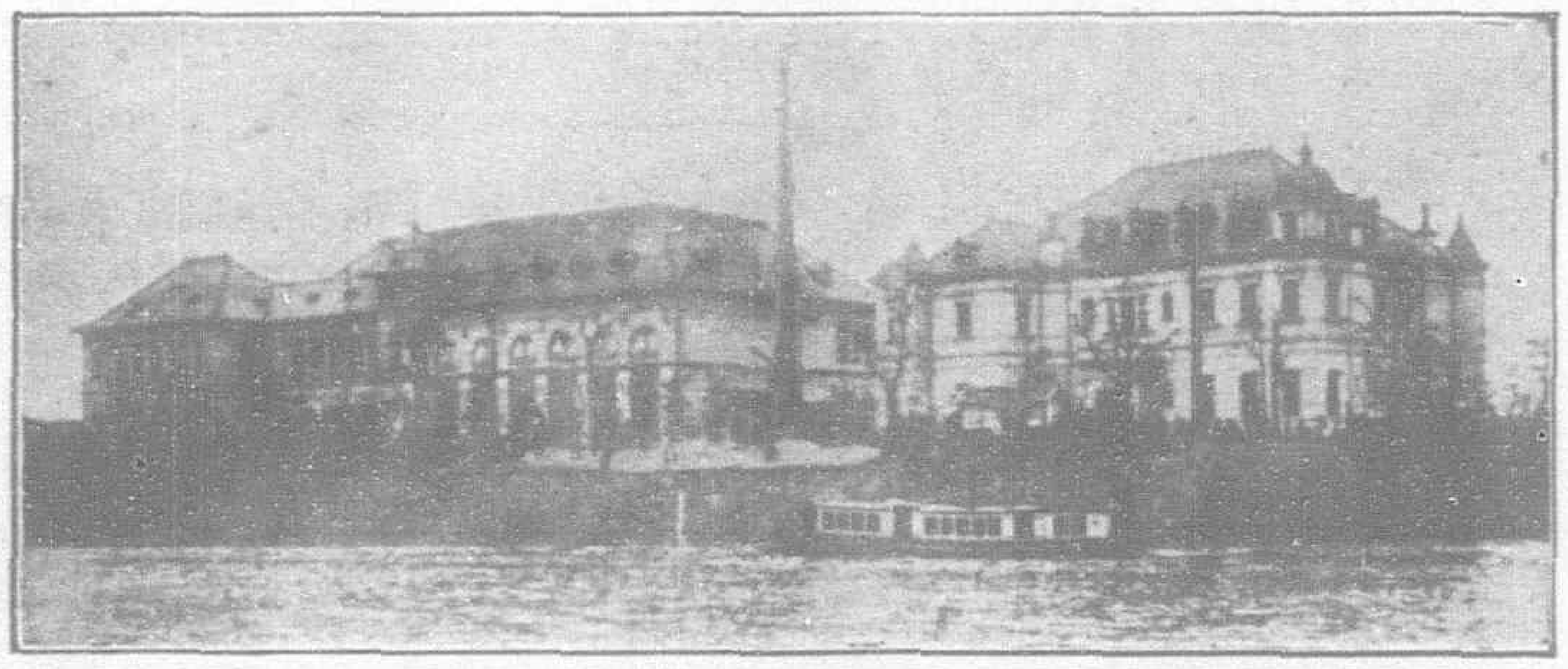

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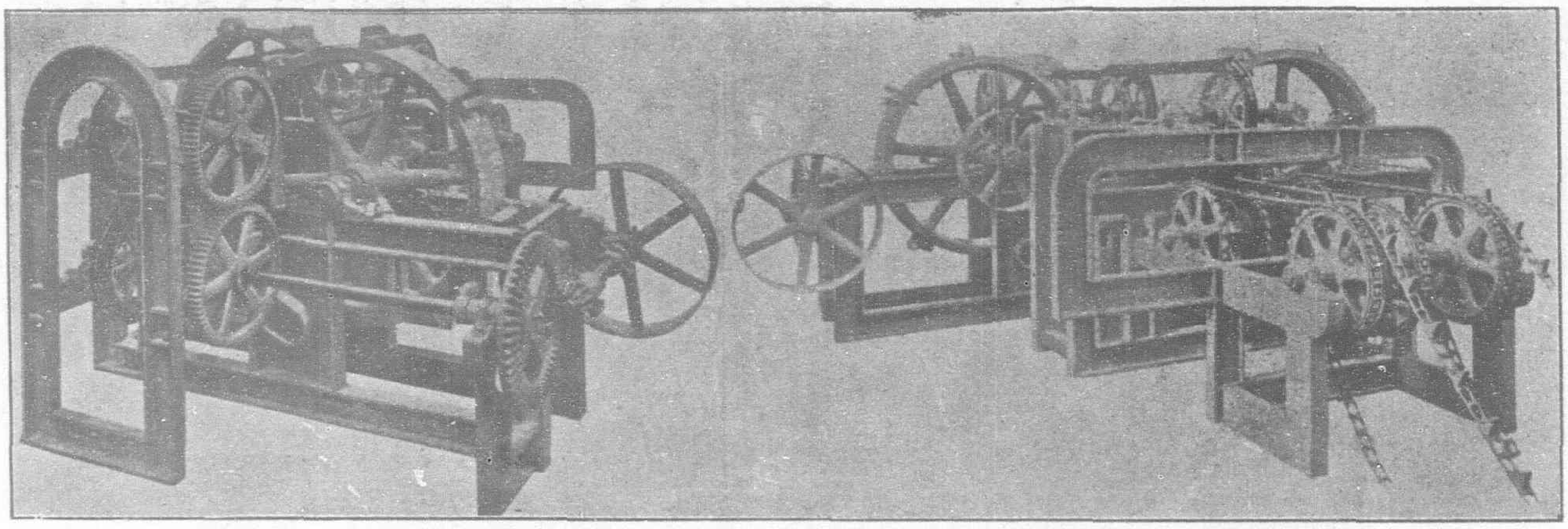

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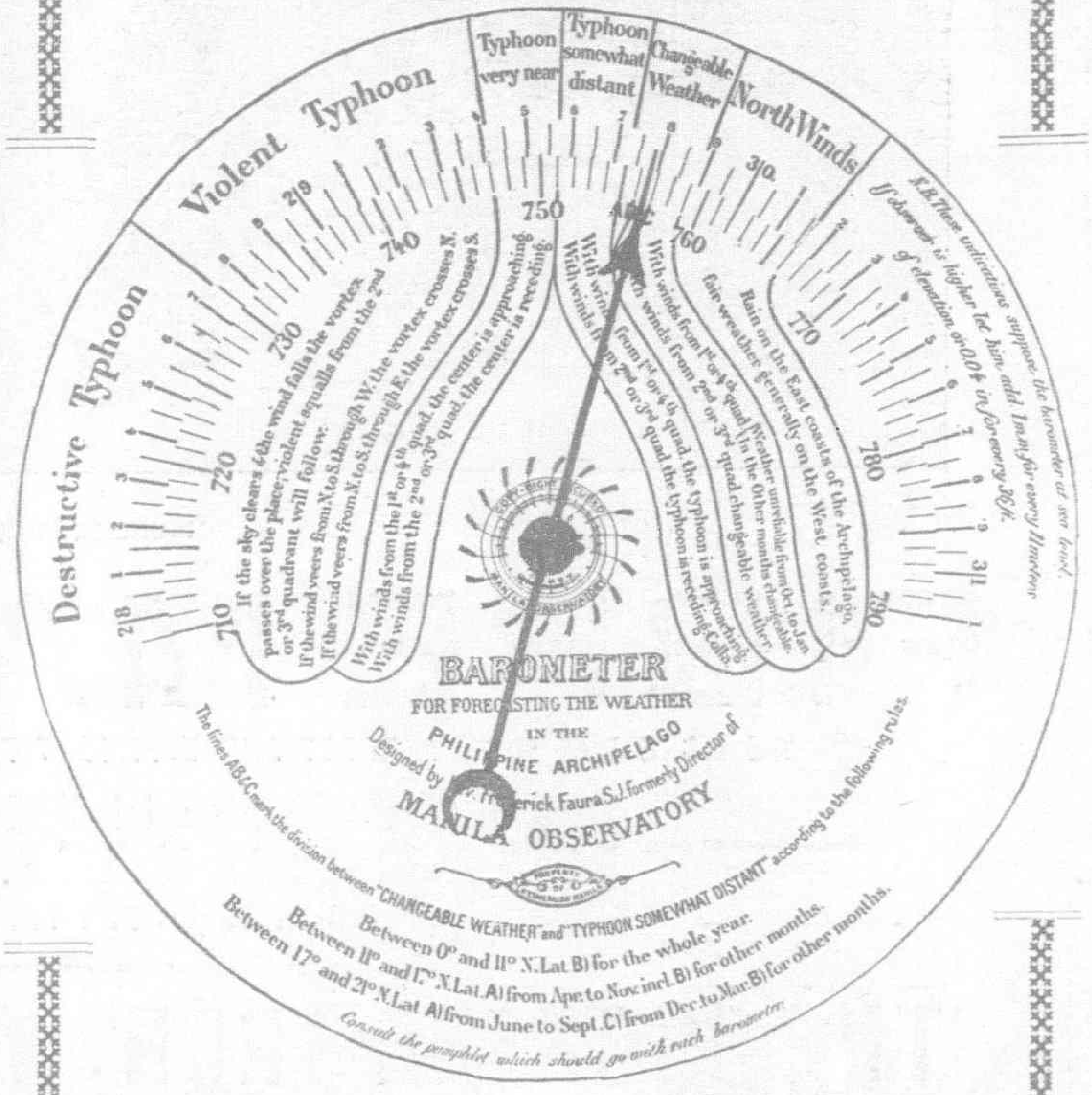

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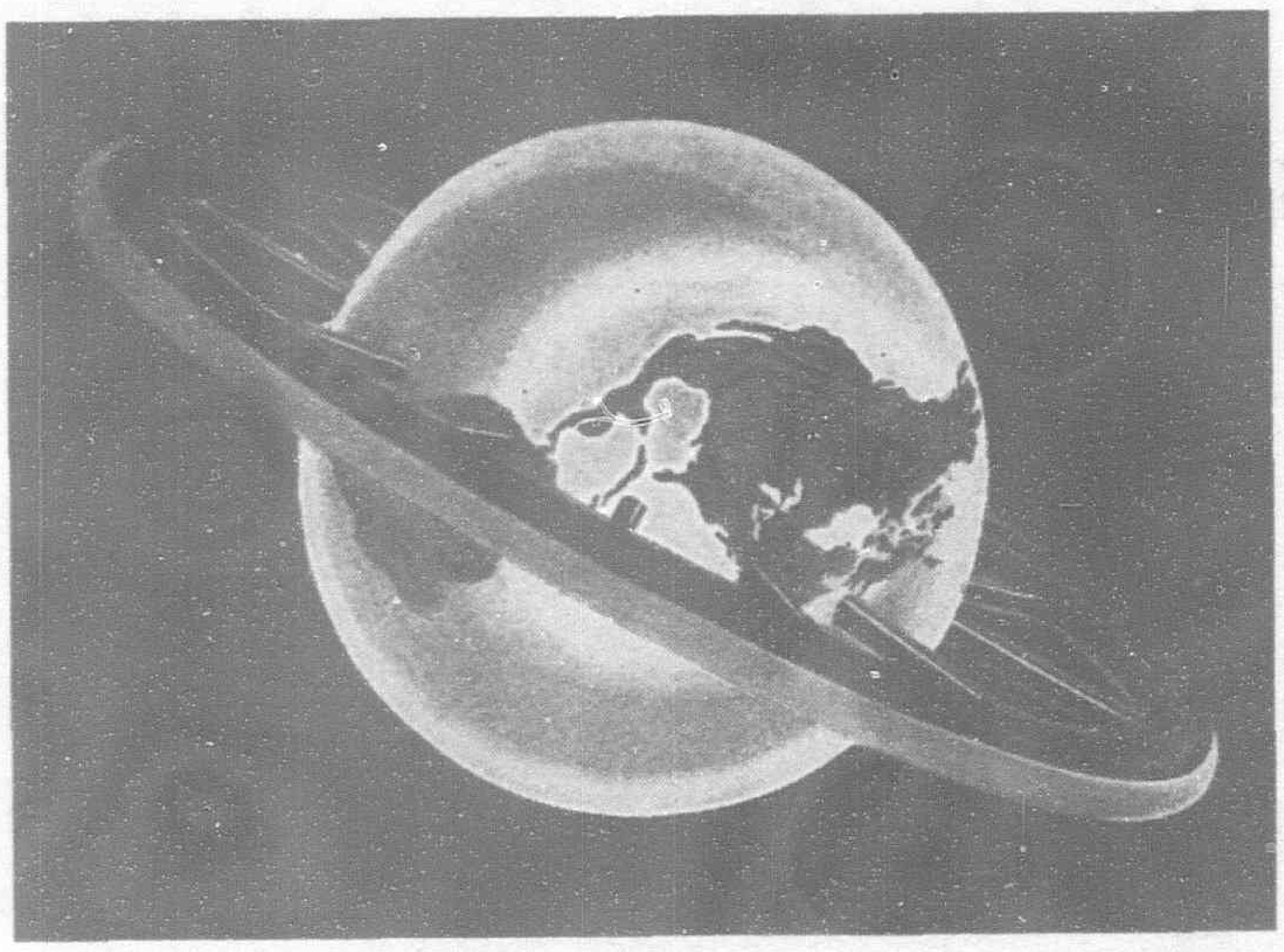

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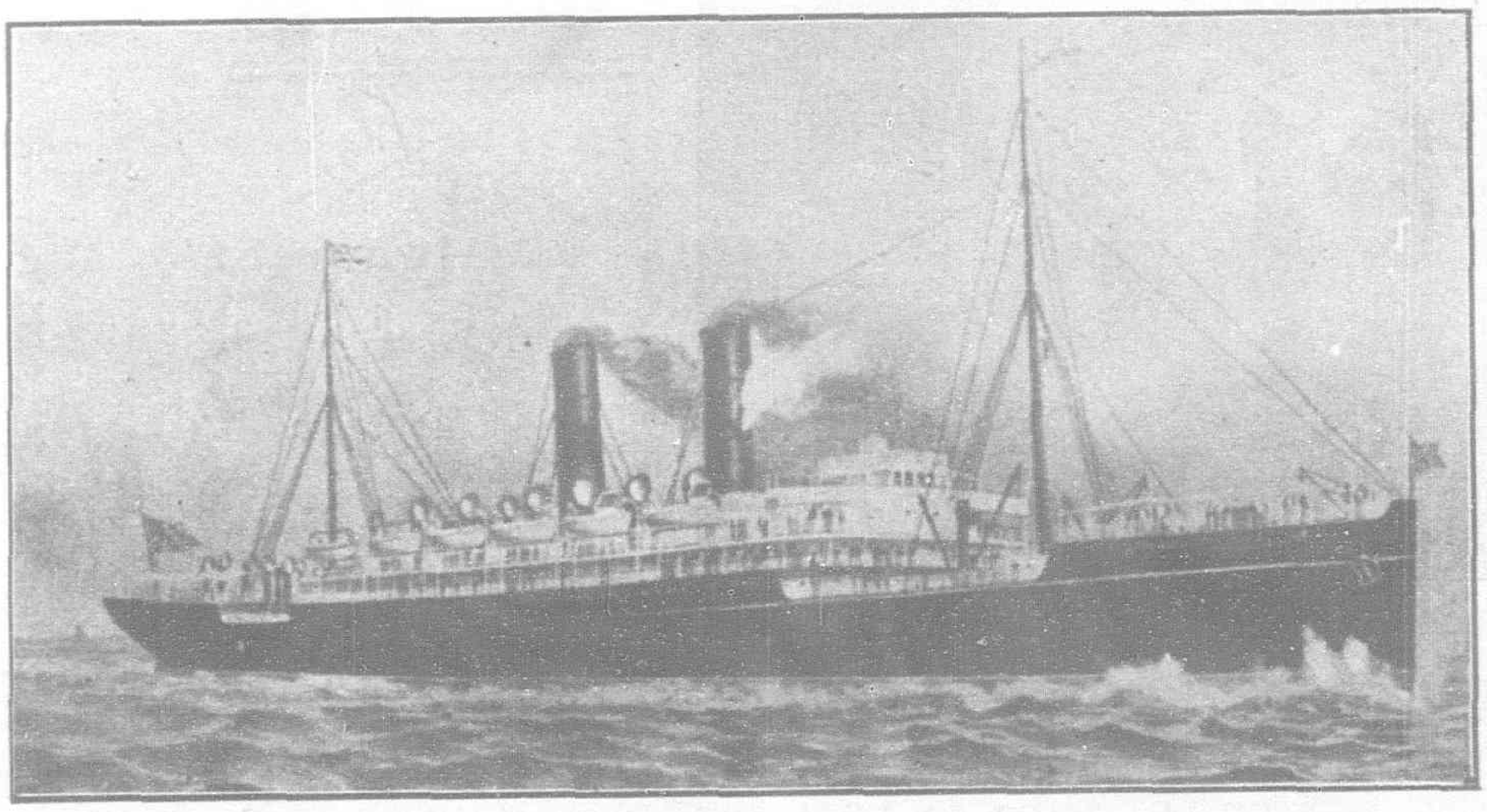

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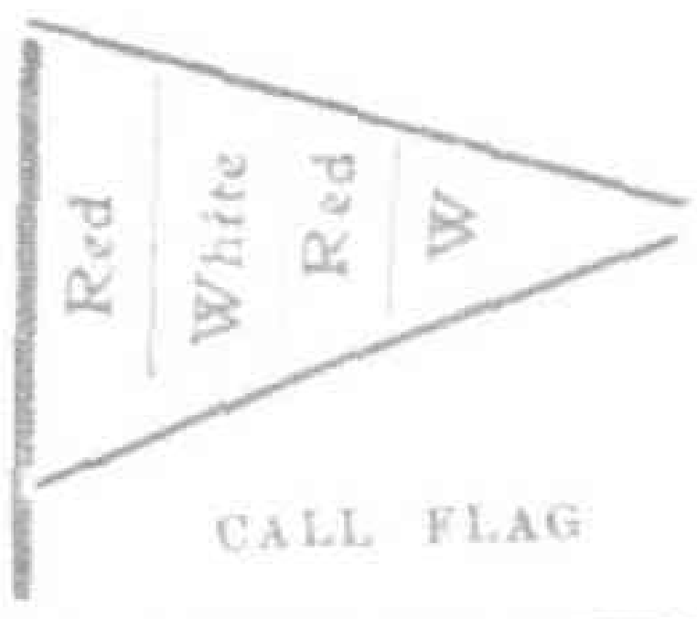

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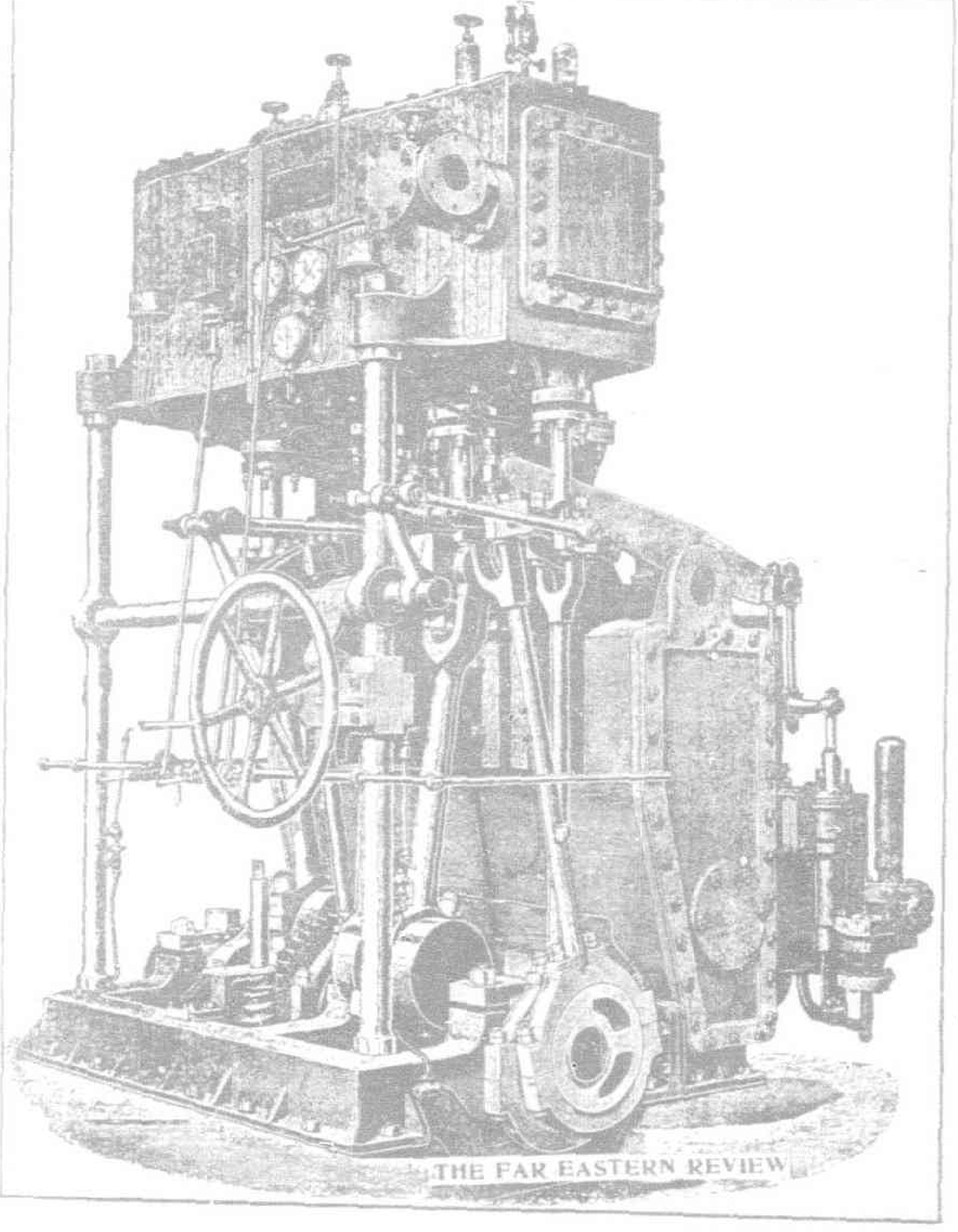

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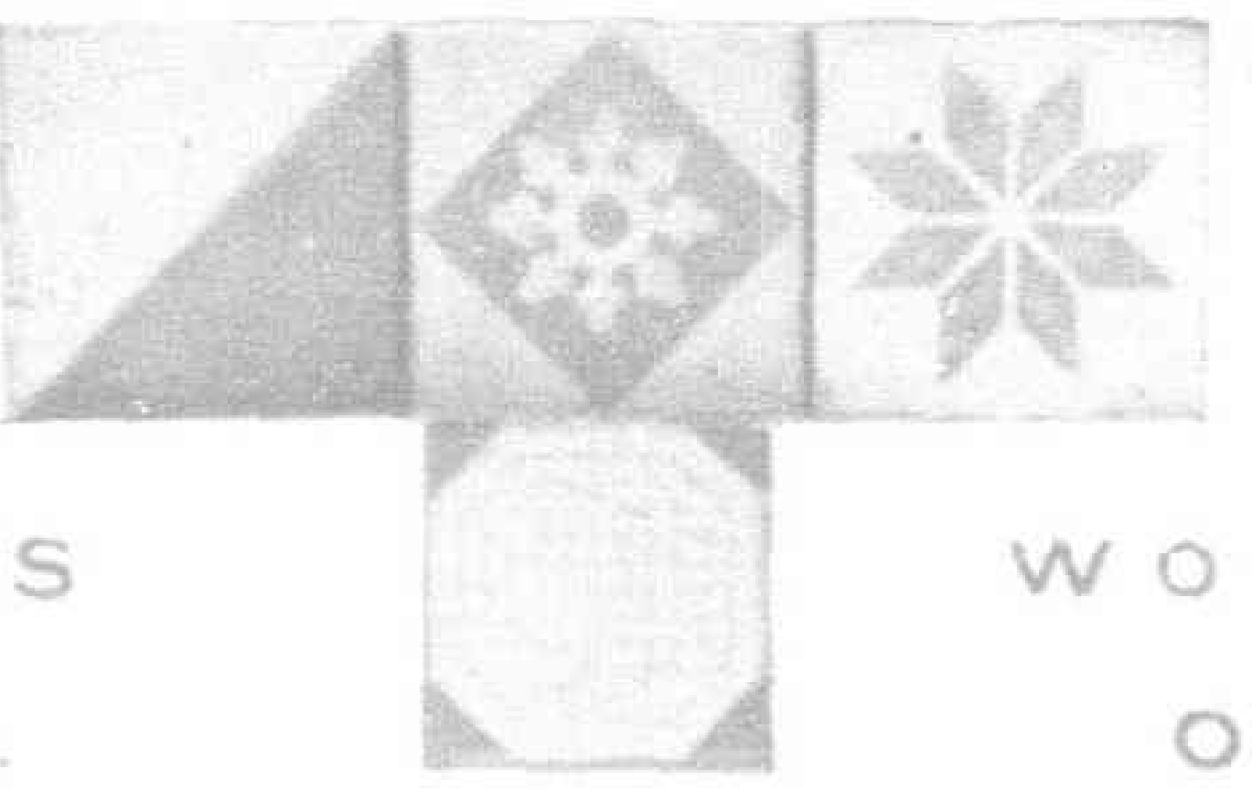

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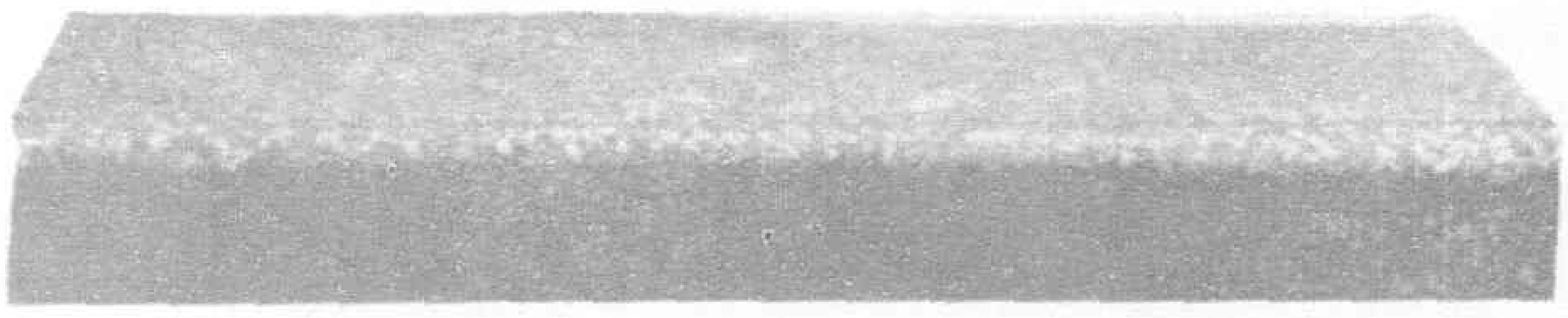

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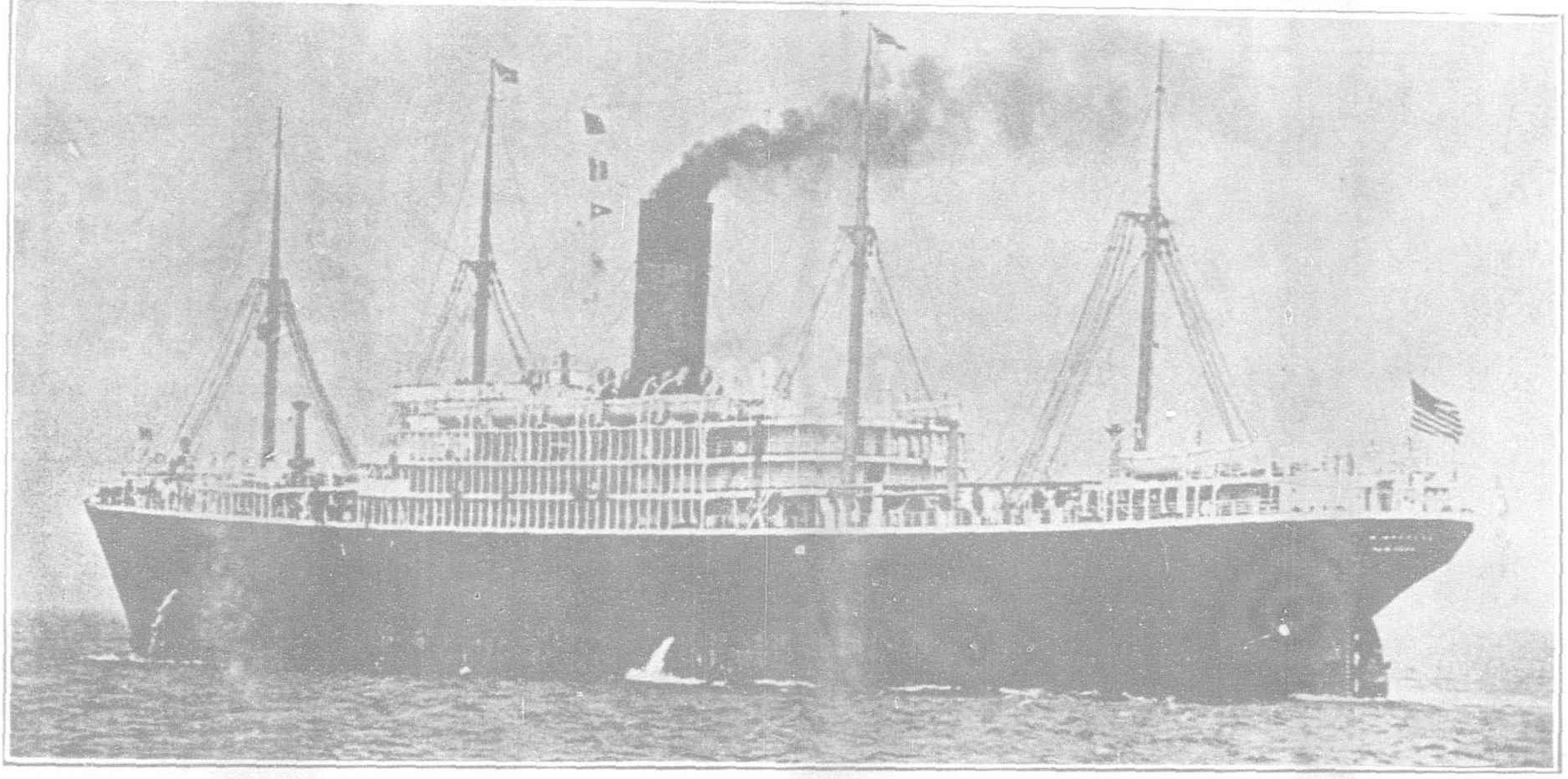

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